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COMPUTER SYSTEMS FOR REDUCTION AND ANALYSIS OF HYDROLOGIC DATA + 3a

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COMPUTER SYSTEMS FOR REDUCTION AND ANALYSIS OF HYDROLOGIC DATA[1]

3a

By V. O. Shanholtz and J. B. Burford[2]

INTRODUCTION

A system of computer programs has been developed at the Blacksburg, Va., Watershed Hydrology Research Project for reducing, processing, and analyzing several types of hydrologic data. The system includes programs for handling data related to precipitation, streamflow, temperature, air movement, soil moisture, and land use. Programs are designed to achieve the routine processing, to make certain analyses and summaries, and to select and arrange data in the required format for direct listing on the standard forms[3,4] which have been developed for the U.S. Department of Agriculture Miscellaneous Publication, "Hydrologic Data for Experimental Agricultural Watersheds in the United States," which is a continuing series.

The programs are written in Fortran IV[5,6] for use on the IBM 7040-1401 computer and are designed to accept input information in data card or magnetic tape form with the output on magnetic tape.

Five separate programs are included in the system, as follows:

Program

A. Precipitation reduction.
B. Runoff reduction.
C. Miscellaneous.
D. Update
E. Publication summaries.

Each program is discussed in separate sections of this report.

PROGRAM A (PRECIPITATION REDUCTION PROGRAM)

The precipitation program performs the following computations:

1. Totals precipitation by storms, days, months, and years.
2. Determines the intensity for all tabulated time increments.

---

[1] Soil and Water Conservation Research Division, Agricultural Research Service, U.S. Department of Agriculture, in cooperation with the Virginia Agricultural Experiment Station, Virginia Polytechnic Institute, Blacksburg.

[2] Formerly agricultural engineer, USDA, ARS,SWCRD, Northeast Branch, Blacksburg, Va., presently agricultural engineer, Agricultural Engineering Department, Virginia Polytechnic Institute Division of Research, Blacksburg,; and hydraulic engineer, USDA, ARS, SWCRD, Northeast Branch, Blacksburg, Va.

[3] Hobbs, H. W., and Crammatte, F. B. Instructions for Preparation of Hydrologic Data for Publication. 1964. [Copy may be obtained from U.S. Dept. Agr., Agr. Res Serv., Soil and Water Conserv. Res. Div., Beltsville, Md.]

[4] Minshall, N. E., Harrold, L. L., Holtan, H. N., and others. Field Manual for Research in Agricultural Hydrology. U.S. Dept. Agr. Agr. Handb. 224. 1961.

[5] IBM 7040/7044 operating system (16/32K) Fortran IV language, file 7040-25, form C-28-6329-2.

[6] IBM 7040/7044 operating system (16/32K) programmer's guide, file 7040-36, form C28-6318-4.

3. Determines the maximum intensities for selected time intervals of 2, 5, 10, 15, 20, and 30 minutes and 1, 2, 4, 6, and 12 hours for all storms having a total accumulation $\geqq$ 0.25 inch.

4. Determines the maximum intensities for the station record for the above selected time intervals.

5. Totals the time that precipitation actually occurred by months and for the period of record being analyzed, which is normally 1 year.

6. Determines the time interval between storms.

7. Checks the data for negative time intervals.

A listing of the source program and a detailed description of the Fortran variables are given in appendix lists A1 and A2, respectively.

Program Constants

Three storage areas are reserved for constants by internal programming routines and are defined as:

1. Days per month (M(I), I = 1, 12).
2. Selected time intervals for maximum intensity computations for 12 different time intervals (IMT(I), I = 1, 12).
3. Time curve--accumulated time by months from the beginning of the year (MHR(I), I = 1, 12).

The numerical value for each constant is given in table A1.

TABLE A1.--Constants required by the precipitation reduction program

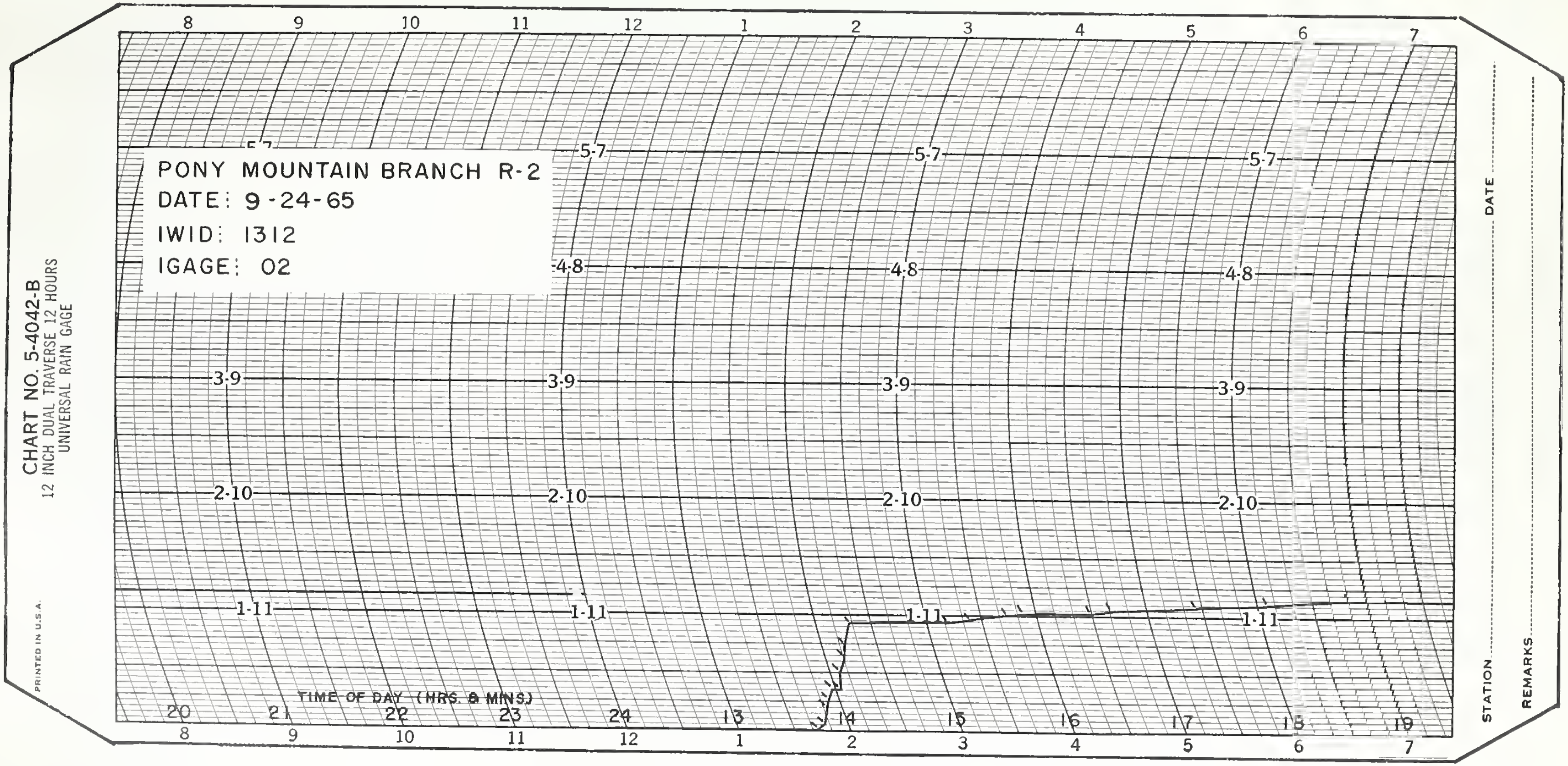
[Where two values are given, the second value refers to leap year]

I	M	IMT	MHR	I	M	IMT	MHR
	Days	Minutes	Hours		Days	Minutes	Hours
1--------	31	2	744	7--------	31	60	5088; 5112
2--------	28; 29	5	1416; 1440	8--------	31	120	5832; 5856
3--------	31	10	2160; 2184	9--------	30	240	6552; 6576
4--------	30	15	2880; 2904	10--------	31	360	7296; 7320
5--------	31	20	3624; 3648	11--------	30	720	8016; 8040
6--------	30	30	4344; 4368	12--------	31	1440	8760; 8784

Input Data

The input data are read from standard 80-column punchcards and transferred to magnetic tape by an IBM 1401 data processing machine for subsequent reduction by the IBM 7040 computer. The input consists of (1) basic data cards and (2) a trailer card to terminate processing.

A sample storm event is shown in figure A1 to illustrate data preparation. The coordinate points, which are indicated by the tic marks, are tabulated on the precipitation code sheet illustrated in table A2. These data may be key-punched from this code sheet with each data field punched in the position indicated under the respective column headings.



PONY MOUNTAIN BRANCH R-2
DATE: 9-24-65
IWID: 1312
IGAGE: 02

Figure A1.--Sample storm event.

TABLE A2. -- Code sheet for recording precipitation data (input for program A)

Date 9-24-65 Sheet 1 of 1

LTYPRE	NEND		IGAGE		IWID				MONTH		NDAY		NYEAR		HR		AMIN		GH				KUPDAT			KSEQ				
2	3	4	9	10	11	12	13	14	15	16	17	18	19	20	21	22	31	32	41	42	43	44	73	74	75	76	77	78	79	80
			0	2	1	3	1	2	0	9	2	4	6	5	1	3	4	5			0	0	P	2	9					1
			0	2	1	3	1	2	0	9	2	4	6	5	1	3	4	9			0	7	P	2	9					2
			0	2	1	3	1	2	0	9	2	4	6	5	1	3	5	1			1	8	P	2	9					3
			0	2	1	3	1	2	0	9	2	4	6	5	1	3	5	5			2	5	P	2	9					4
			0	2	1	3	1	2	0	9	2	4	6	5	1	3	5	9			3	5	P	2	9					5
			0	2	1	3	1	2	0	9	2	4	6	5	1	4	0	5			3	5	P	2	9					6
			0	2	1	3	1	2	0	9	2	4	6	5	1	4	0	6			5	0	P	2	9					7
			0	2	1	3	1	2	0	9	2	4	6	5	1	4	1	1			6	3	P	2	9					8
			0	2	1	3	1	2	0	9	2	4	6	5	1	4	1	3			7	5	P	2	9					9
			0	2	1	3	1	2	0	9	2	4	6	5	1	4	1	6			8	2	P	2	9				1	0
			0	2		3	1	2	0	9	2	4	6	5	1	4	1	9			9	3	P	2	9				1	1
			0	2	1	3	1	2	0	9	2	4	6	5	1	5	1	2			9	4	P	2	9				1	2
			0	2	1	3	1	2	0	9	2	4	6	5	1	5	2	4			9	7	P	2	9				1	3
			0	2	1	3	1	2	0	9	2	4	6	5	1	5	4	4		1	0	0	P	2	9				1	4
			0	2	1	3	1	2	0	9	2	4	6	5	1	5	5	5		1	0	1	P	2	9				1	5
			0	2	1	3	1	2	0	9	2	4	6	5	1	6	3	0		1	0	2	P	2	9				1	6
			0	2	1	3	1	2	0	9	2	4	6	5	1	6	4	2		1	0	5	P	2	9				1	7
			0	2	1	3	1	2	0	9	2	4	6	5	1	6	5	7		1	0	6	P	2	9				1	8
			0	2	1	3	1	2	0	9	2	4	6	5	1	7	2	8		1	0	7	P	2	9				1	9
			0	2	1	3	1	2	0	9	2	4	6	5	1	8	0	5		1	1	1	P	2	9				2	0
			0	2	1	3	1	2	0	9	2	4	6	5	1	8	5	0		1	1	5	P	2	9				2	1
	9	9	0	2	1	3	1	2	1	3	3	2	6	5									P	2	9				2	2

Tabulated by ________ Checked by ________

Data Card

The following shows the card format for the basic input data card:

2	3-4	9-10	11-14	15-16	17-18	19-20
X	XX	XX	XXXX	XX	XX	XX
LTYPRE	NEND	IGAGE	IWID	MONTH	NDAY	NYEAR

21-22	31-32	41-44	73-75	76-80
XX.	XX.	XX.XX	XXX	XXXXX
HR	AMIN	GH	KUPDAT	KSEQ

Decimal points are not punched. The only requirement is that all data must be right justified in their respective data fields. Appendix list A2 gives a detailed description of the variable names. NEND is always zero or left blank in the basic data card.

Trailer Cards

The following information is required in the trailer card. The card image is identical to the basic data card.

3-4	9-10	11-14	15-16	17-18	19-20	73-75
XX	XX	XXXX	XX	XX	XX	XXX
NEND	IGAGE	IWID	MONTH	NDAY	NYEAR	KUPDAT

76-80
XXXXX
KSEQ

NEND	9 for intermediate rain gage station. 99 for last rain gage station.
IGAGE	Same as on last basic data card.
IWID	Same as on last basic data card.
MONTH	13.
NDAY	32.
NYEAR	Same as on last basic data card.
KUPDAT	Same as on last basic data card.
KSEQ	Sequence number (one greater than last basic data card).

Special Codes

The following special coding is required:

1. An identification code designating the type of precipitation. This coding is required for program D, which summarizes the data for the U.S. Department of Agriculture Miscellaneous Publication, "Hydrologic Data for Experimental Agricultural Watersheds in the United States."
2. An identification code that will allow easy address of any line of data (magnetic tape) so that corrections, additions, or deletions can be readily made in the input tape or the output storage tape.

TABLE A3.--Type of precipitation codes required for processing precipitation data

Type of precipitation	Code	Type of precipitation	Code
Rainfall	Blank	Sleet	L
Snow	S	Hail	H
Rain and snow	N	Mixed precipitation (rain, snow, sleet)	M

TABLE A4.--Identification codes to allow for corrections, additions, or deletions to magnetic tapes (input/output data tapes)

Location	Rain gage	Update identification code (KUPDAT)
Moorefield, W. Va.	R-1(A)	P01
Do	R-2(B)	P02
Do	R-3(C)	P03
Thorne Creek, Va.	R-1	P04
Do	R-2	P05
Do	R-3	P06
Crab Creek, Va.	R-1	P07
Do	R-2	P08
Do	R-3	P09
Do	R-4	P10
Do	R-5-12	P11-P18[1]
Brush Creek, Va.	R-1	P19
Do	R-2	P20
Powells Creek, Va.	R-1	P21
Do	R-2	P22
Little Winns Creek, Va.	R-1	P23
Do	R-2	P24
Do	R-3	P25
Rocky Run Branch, Va.	R-1	P26
Do	R-2	P27
Pony Mountain Branch, Va.	R-1	P28
Do	R-2	P29
Chub Run, Va.	R-1	P30
Do	R-2	P31
Do	R-3	P32
Fosters Creek, Va.	R-1	P33
Do	R-2	P34
Chestnut Branch, Va.	R-1	P35
Do	R-2	P36
Do	R-3	P37

[1] Rain gage stations have not been installed.

Table A3 illustrates the coding required under item 1 above. Table A4 gives the coding scheme used for updating magnetic tapes at Blacksburg, Va. Note that the selection of KUPDAT is arbitrary. The P represents precipitation. The next two numeric digits are simply sequential numbers that have been arbitrarily assigned to the rain gages at Blacksburg.

Order of Input

All input cards must be stacked for processing as follows:

1. Cards that may be required by the computer residence.
2. Objective deck.
3. Basic data cards (one station record).
4. Trailer card.
5. Repeat steps 3 and 4 for additional records.

An example of the order of input for the IBM 7040/1401 installation at Virginia Polytechnic Institute, Blacksburg, Va., is given in figure A2.

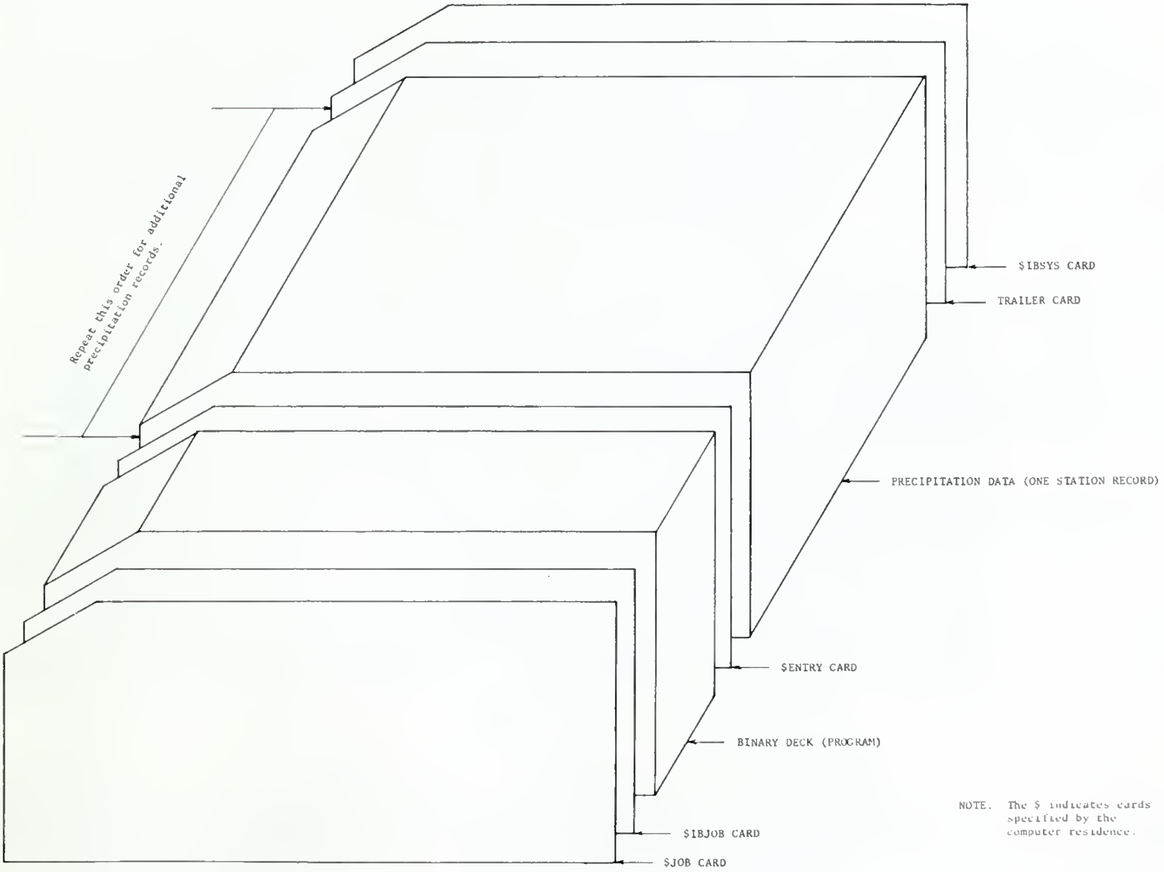

Repeat this order for additional precipitation records.
$IBSYS CARD
TRAILER CARD
PRECIPITATION DATA (ONE STATION RECORD)
$ENTRY CARD
BINARY DECK (PROGRAM)
$IBJOB CARD
$JOB CARD
NOTE. The $ indicates cards specified by the computer residence.

Figure A2.--Schematic diagram illustrating the card stacking order for the input data required by program A. The computer residence cards are those required by the IBM 7040/1401 installation at Virginia Polytechnic Institute, Blacksburg, Va.

Output Data

The output is placed on magnetic tape by utility units S.SU00 for permanent storage and S.SU06 for listing and temporary storage. The data from S.SU06 contains page numbers, column identification, and basic output data, which will result in the format illustrated by table A5 when listed by the IBM 1401. When the permanent storage tape is listed, the result is the format given in table A6. These two tables are an abbreviated display of the output for one year's data collected at the R-2 rain gage, which is located on the Pony Mountain Branch watershed. Note that both tapes contain the same basic data and the same sequence number. Also note that each line of data on the permanent storage tape contains a value for KUPDAT. The importance of KUPDAT and the sequence number will become evident when programs D and E have been studied.

Each output tape includes the following output data summaries:

1. One line of data for each input card.
2. Two lines of data for the maximum intensities for selected time intervals (IMT) for storm events ≥ 0.25 inch.
3. One line of data for each monthly summary.
4. One line of data for the yearly summary.
5. Two lines of data for the maximum intensities, for the same time intervals listed in item 2 above, for the period of record (normally 1 year).
6. End of record code.

Each different output summary has a unique code (KODE) except the error output as described on page 12. The following information is contained in each output code. The format for S.SU06 is listed first, followed by the format for S.SU00 (storage tape). Note that the information contained in each format illustration is identified by, reading from top to bottom, (1) print position or card column, whichever is applicable, (2) data format specification, and (3) the Fortran variable name.

UTILITY UNIT S.SU06 Output Format (For listing and temporary storage)

Note that the numbers refer to print position on the IBM 1401 which prints 10 characters per inch, with the extreme left position designated as No. 1.

KODE = 0 (line of basic data).--

2-7	11-12	16-19	20-24	25-28	29-31	42
+XXXXX	XX	XXXX	+XXXX	+XXX	+ XX	X
NUM	IGAGE	IWID	MONTH	NDAY	NYEAR	LTYPRE

43-54	58-68	69-79	80-90	91-102
+ XXXXXX.XXXX	+ XXXXX.XXXX	+XXXXX.XXXX	+ XXXXX.XXXX	+ XXXXXX.XXXX
HR	TI	AI	ACP	STAC

103-114	115-124	125-129
+ XXXXXX.XXXX	+ XXXX.XXXX	+ XXXX
DAC	AMAC	KODE

TABLE A5. - 1965 PRECIPITATION OUTPUT IN ABBREVIATED FORM FOR R-2 RAIN GAGE, PONY MOUNTAIN BRANCH WATERSHED, CULPEPER, VIRGINIA. OUTPUT FORMAT FOR IBM 1401 LISTING ONLY (S.SU06)

```
                                                                                                                      PAGE  1
                                RAINFALL TABULATIONS'WATERSHEO ENGINEERING'BLACKSBURG,VA.

  SEQ.  GAGE WATSHO    OATE     STORM TYPE TIME OF OAY TIME INTERVAL INTENSITY    ACCUM.  STORM ACCUM.  O  ACCUM.  MON ACCUM CODE
NUMBER  NO.   NO.  MO. OAY YR    NO.  PREC     HOURS      IN HOURS     (IN/HR)   PER TIME   (INCHES)    (INCHES)   (INCHES)
     1   02  1312   1   1 65                 13.0000      13.0000     0.0000     0.0000     0.0000      0.0000     0.0000     0
     2   02  1312   1   1 65                 14.5000       1.5000     0.0133     0.0200     0.0200      0.0200     0.0200     0
     3   02  1312   1   1 65                 15.7333       1.2333     0.0405     0.0500     0.0700      0.0700     0.0700     0
     4   02  1312   1   1 65                 16.5000       0.7667     0.0652     0.0500     0.1200      0.1200     0.1200     0
     5   02  1312   1   1 65                 18.0000       1.5000     0.0400     0.0600     0.1800      0.1800     0.1800     0
     6   02  1312   1   1 65                 20.5000       2.5000     0.0080     0.0200     0.2000      0.2000     0.2000     0
     7   02  1312   1   1 65                 21.5000       1.0000     0.0100     0.0100     0.2100      0.2100     0.2100     0
     8   02  1312   1   1 65                 22.1667       0.6667     0.0600     0.0400     0.2500      0.2500     0.2500     0
     9   02  1312   1   1 65                 22.5000       0.3333     0.1200     0.0400     0.2900      0.2900     0.2900     0
    10   02  1312   1   1 65    1                          0.1200     0.1200     0.1200     0.1200      0.1200     0.1000     9
    11   02  1312   1   1 65    1                          0.0800     0.0500     0.0417     0.0313      0.0000     0.0000     9
    12   02  1312   1   1 65                 23.5000       1.0000     0.0000     0.0000     0.0000      0.2900     0.2900     0
    13   02  1312   1   1 65                 24.0000       0.5000     0.0200     0.0100     0.0100      0.3000     0.3000     0
    14   02  1312   1   2 65                  4.0000       4.0000     0.0200     0.0800     0.0900      0.0800     0.3800     0
    15   02  1312   1   2 65                  5.8333       1.8333     0.0000     0.0000     0.0000      0.0800     0.3800     0
    16   02  1312   1   2 65                  6.5000       0.6667     0.0300     0.0200     0.0200      0.1000     0.4000     0
    17   02  1312   1   7 65                 21.3333     134.8333     0.0000     0.0000     0.0000      0.0000     0.4000     0
    18   02  1312   1   7 65                 24.0000       2.6667     0.0712     0.1900     0.1900      0.1900     0.5900     0
    19   02  1312   1   8 65                  1.5000       1.5000     0.0533     0.0800     0.2700      0.0800     0.6700     0
    20   02  1312   1   8 65    2                          0.0713     0.0713     0.0713     0.0713      0.0713     0.0713     9
    21   02  1312   1   8 65    2                          0.0713     0.0713     0.0653     0.0000      0.0000     0.0000     9
    22   02  1312   1   8 65                  2.5000       1.0000     0.0000     0.0000     0.0000      0.0800     0.6700     0
    23   02  1312   1   8 65                  3.5000       1.0000     0.0200     0.0200     0.0200      0.1000     0.6900     0
    24   02  1312   1   9 65                 13.0000      33.5000     0.0000     0.0000     0.0000      0.0000     0.6900     0
                .                                                                                                .
                .                                                                                                .
                .                                                                                                .
                .                                                                                                .
                .                                                                                                .
   551   02  1312   8  23 65                 13.0000      27.5000     0.0000     0.0000     0.0000      0.0000     1.7900     0
   552   02  1312   8  23 65                 13.3333       0.3333     0.6300     0.2100     0.2100      0.2100     2.0000     0
   553   02  1312   8  25 65                 19.5000      54.1667     0.0000     0.0000     0.0000      0.0000     2.0000     0
   554   02  1312   8  25 65                 19.5333       0.0333     2.1005     0.0700     0.0700      0.0700     2.0700     0
   555   02  1312   8  25 65                 19.5833       0.0500     0.8002     0.0400     0.1100      0.1100     2.1100     0
   556   02  1312   8  25 65                 19.6167       0.0333     1.8004     0.0600     0.1700      0.1700     2.1700     0
   557   02  1312   8  25 65                 19.7500       0.1334     0.8248     0.1100     0.2800      0.2800     2.2800     0
   558   02  1312   8  25 65                 19.9667       0.2166     0.3232     0.0700     0.3500      0.3500     2.3500     0
                .                                                                                                .
                .                                                                                                .
                .                                                                                                .
                .                                                                                                .
                .                                                                                                .
   618   02  1312   9  16 65                 18.0833      83.7500     0.0000     0.0000     0.0000      0.0000     1.7300     0
   619   02  1312   9  16 65                 19.3333       1.2500     0.1200     0.1500     0.1500      0.1500     1.8800     0
   620   02  1312   9  24 65                  5.1167     177.7833     0.0000     0.0000     0.0000      0.0000     1.8800     0
   621   02  1312   9  24 65                  5.5000       0.3834     0.4174     0.1600     0.1600      0.1600     2.0400     0
   622   02  1312   9  24 65                 13.7500       8.2500     0.0000     0.0000     0.0000      0.1600     2.0400     0
   623   02  1312   9  24 65                 13.8167       0.0667     1.0503     0.0700     0.0700      0.2300     2.1100     0
   624   02  1312   9  24 65                 13.8500       0.0333     3.3008     0.1100     0.1800      0.3400     2.2200     0
   625   02  1312   9  24 65                 13.9167       0.0667     1.0503     0.0700     0.2500      0.4100     2.2900     0
   626   02  1312   9  24 65                 13.9833       0.0667     1.5004     0.1000     0.3500      0.5100     2.3900     0
   627   02  1312   9  24 65                 14.0833       0.1000     0.0000     0.0000     0.3500      0.5100     2.3900     0
   628   02  1312   9  24 65                 14.1000       0.0167     9.0022     0.1500     0.5000      0.6600     2.5400     0
   629   02  1312   9  24 65                 14.1833       0.0833     1.5604     0.1300     0.6300      0.7900     2.6700     0
   630   02  1312   9  24 65                 14.2167       0.0333     3.6009     0.1200     0.7500      0.9100     2.7900     0
   631   02  1312   9  24 65                 14.2667       0.0500     1.3986     0.0700     0.8200      0.9800     2.8600     0
   632   02  1312   9  24 65                 14.3167       0.0500     2.2005     0.1100     0.9300      1.0900     2.9700     0
   633   02  1312   9  24 65                 15.2000       0.8833     0.0113     0.0100     0.9400      1.1000     2.9800     0
   634   02  1312   9  24 65                 15.4000       0.2000     0.1500     0.0300     0.9700      1.1300     3.0100     0
   635   02  1312   9  24 65                 15.7333       0.3333     0.0900     0.0300     1.0000      1.1600     3.0400     0
   636   02  1312   9  24 65                 15.9167       0.1833     0.0545     0.0100     1.0100      1.1700     3.0500     0
   637   02  1312   9  24 65                 16.5000       0.5834     0.0171     0.0100     1.0200      1.1800     3.0600     0
   638   02  1312   9  24 65                 16.7000       0.2000     0.1500     0.0300     1.0500      1.2100     3.0900     0
   639   02  1312   9  24 65                 16.9500       0.2500     0.0400     0.0100     1.0600      1.2200     3.1000     0
   640   02  1312   9  24 65                 17.4667       0.5167     0.0194     0.0100     1.0700      1.2300     3.1100     0
   641   02  1312   9  24 65                 18.0833       0.6167     0.0649     0.0400     1.1100      1.2700     3.1500     0
   642   02  1312   9  24 65                 18.8333       0.7500     0.0533     0.0400     1.1500      1.3100     3.1900     0
   643   02  1312   9  24 65   29                          5.2800     3.0480     2.6800     2.3208      1.7434     1.7200     9
   644   02  1312   9  24 65   29                          0.9349     0.5005     0.2721     0.0000      0.0000     0.0000     9
   645   02  1312   9     65                              24.4833                                                  3.1900     6
   646   02  1312  10   1 65                  1.5000     150.6667     0.0000     0.0000     0.0000      0.0000     0.0000     0
   647   02  1312  10   1 65                  5.8333       4.3333     0.0277     0.1200     0.1200      0.1200     0.1200     0
   648   02  1312  10   1 65                 10.0000       4.1667     0.0000     0.0000     0.0000      0.1200     0.1200     0
                .                                                                                                .
                .                                                                                                .
                .                                                                                                .
                .                                                                                                .
                .                                                                                                .
   713   02  1312  11  27 65           E      7.9167     118.9166     0.0000     0.0000     0.0000      0.0000     0.6600     0
   714   02  1312  11  27 65           E      8.5000       0.5834     0.0343     0.0200     0.0200      0.0200     0.6800     0
   715   02  1312  11     65                              22.1667                                                  0.6800     6
   716   02  1312  12   6 65           E      8.0000     215.5000     0.0000     0.0000     0.0000      0.0000     0.0000     0
   717   02  1312  12   6 65           E      9.0000       1.0000     0.0100     0.0100     0.0100      0.0100     0.0100     0
   718   02  1312  12  11 65           E      3.5000     114.5000     0.0000     0.0000     0.0000      0.0000     0.0100     0
   719   02  1312  12  11 65           E      4.0000       0.5000     0.0200     0.0100     0.0100      0.0100     0.0200     0
   720   02  1312  12  13 65                  0.5000      44.5000     0.0000     0.0000     0.0000      0.0000     0.0200     0
   721   02  1312  12  13 65                  5.0000       4.5000     0.0400     0.1800     0.1800      0.1800     0.2000     0
   722   02  1312  12  20 65                 22.5000     185.5000     0.0000     0.0000     0.0000      0.0000     0.2000     0
   723   02  1312  12  20 65                 24.0000       1.5000     0.0067     0.0100     0.0100      0.0100     0.2100     0
   724   02  1312  12  21 65                  1.0000       1.0000     0.0100     0.0100     0.0200      0.0100     0.2200     0
   725   02  1312  12  21 65                  2.0000       1.0000     0.0000     0.0000     0.0000      0.0100     0.2200     0
   726   02  1312  12  21 65                  3.0000       1.0000     0.0100     0.0100     0.0100      0.0200     0.2300     0
   727   02  1312  12  25 65           E      5.7500      98.7500     0.0000     0.0000     0.0000      0.0000     0.2300     0
   728   02  1312  12  25 65           E      8.0000       2.2500     0.0222     0.0500     0.0500      0.0500     0.2800     0
   729   02  1312  12  25 65           E     12.5000       4.5000     0.0000     0.0000     0.0000      0.0500     0.2800     0
   730   02  1312  12  25 65           E     13.2500       0.7500     0.2267     0.1700     0.1700      0.2200     0.4500     0
   731   02  1312  12     65                              12.5000                                                  0.4500     6
   732   02  1312         65                             405.6670                                                 28.8100     7

   733     MAXIMUM INTENSITY FOR YEAR(2,5,10,15,20,30M)     5.2800     3.3600     2.6800     2.3208      1.7434     1.7200     3
   734     MAXIMUM INTENSITY FOR YEAR(1,2,4,6,12,24HRS)     0.9349     0.5005     0.2857     0.2661      0.2217     0.0000     3
   735          999  WATERSHEO IOENTIFICATION FOR UPOATING STORAGE TAPE = P29                                                 2
```

TABLE A6. -- 1965 PRECIPITATION OUTPUT IN ABBREVIATED FORM FOR R-2 RAIN GAGE, PONY MOUNTAIN BRANCH WATERSHED, CULPEPER, VIRGINIA. OUTPUT FORMAT FOR PERMANENT STORAGE (S.SUOO)

```
(1-4)* (6-7) (8-10) (11-13) (14-16) (17-24) (25-34) (35-42) (43-50) (51-58) (59-66) (67-74) (77) (78-80) (83-85) (86-90)

1312 02  1  1 65 13.0000   13.0000  0.0000  0.0000  0.0000  0.0000  0.0000     0  P29    1
1312 02  1  1 65 14.5000    1.5000  0.0133  0.0200  0.0200  0.0200  0.0200     0  P29    2
1312 02  1  1 65 15.7333    1.2333  0.0405  0.0500  0.0700  0.0700  0.0700     0  P29    3
1312 02  1  1 65 16.5000    0.7667  0.0652  0.0500  0.1200  0.1200  0.1200     0  P29    4
1312 02  1  1 65 18.0000    1.5000  0.0400  0.0600  0.1800  0.1800  0.1800     0  P29    5
1312 02  1  1 65 20.5000    2.5000  0.0080  0.0200  0.2000  0.2000  0.2000     0  P29    6
1312 02  1  1 65 21.5000    1.0000  0.0100  0.0100  0.2100  0.2100  0.2100     0  P29    7
1312 02  1  1 65 22.1667    0.6667  0.0600  0.0400  0.2500  0.2500  0.2500     0  P29    8
1312 02  1  1 65 22.5000    0.3333  0.1200  0.0400  0.2900  0.2900  0.2900     0  P29    9
1312 02  1  1 65       1    0.1200  0.1200  0.1200  0.1200  0.1200  0.1000     9  P29   10
1312 02  1  1 65       1    0.0800  0.0500  0.0417  0.0313  0.0000  0.0000     9  P29   11
1312 02  1  1 65 23.5000    1.0000  0.0000  0.0000  0.0000  0.2900  0.2900     0  P29   12
1312 02  1  1 65 24.0000    0.5000  0.0200  0.0100  0.0100  0.3000  0.3000     0  P29   13
1312 02  1  2 65  4.0000    4.0000  0.0200  0.0800  0.0900  0.0800  0.3800     0  P29   14
1312 02  1  2 65  5.8333    1.8333  0.0000  0.0000  0.0000  0.0800  0.3800     0  P29   15
1312 02  1  2 65  6.5000    0.6667  0.0300  0.0200  0.0200  0.1000  0.4000     0  P29   16
1312 02  1  7 65 21.3333  134.8333  0.0000  0.0000  0.0000  0.0000  0.4000     0  P29   17
1312 02  1  7 65 24.0000    2.6667  0.0712  0.1900  0.1900  0.1900  0.5900     0  P29   18
1312 02  1  8 65  1.5000    1.5000  0.0533  0.0800  0.2700  0.0800  0.6700     0  P29   19
1312 02  1  8 65       2    0.0713  0.0713  0.0713  0.0713  0.0713  0.0713     9  P29   20
1312 02  1  8 65       2    0.0713  0.0713  0.0653  0.0000  0.0000  0.0000     9  P29   21
1312 02  1  8 65  2.5000    1.0000  0.0000  0.0000  0.0000  0.0800  0.6700     0  P29   22
1312 02  1  8 65  3.5000    1.0000  0.0200  0.0200  0.0200  0.1000  0.6900     0  P29   23
1312 02  1  9 65 13.0000   33.5000  0.0000  0.0000  0.0000  0.0000  0.6900     0  P29   24
         .                                                                  .
         .                                                                  .
         .                                                                  .
1312 02  8 23 65 13.0000   27.5000  0.0000  0.0000  0.0000  0.0000  1.7900     0  P29  551
1312 02  8 23 65 13.3333    0.3333  0.6300  0.2100  0.2100  0.2100  2.0000     0  P29  552
1312 02  8 25 65 19.5000   54.1667  0.0000  0.0000  0.0000  0.0000  2.0000     0  P29  553
1312 02  8 25 65 19.5333    0.0333  2.1005  0.0700  0.0700  0.0700  2.0700     0  P29  554
1312 02  8 25 65 19.5833    0.0500  0.8002  0.0400  0.1100  0.1100  2.1100     0  P29  555
1312 02  8 25 65 19.6167    0.0333  1.8004  0.0600  0.1700  0.1700  2.1700     0  P29  556
1312 02  8 25 65 19.7500    0.1334  0.8248  0.1100  0.2800  0.2800  2.2800     0  P29  557
1312 02  8 25 65 19.9667    0.2166  0.3232  0.0700  0.3500  0.3500  2.3500     0  P29  558
         .                                                                  .
         .                                                                  .
         .                                                                  .
1312 02  9 16 65 18.0833   83.7500  0.0000  0.0000  0.0000  0.0000  1.7300     0  P29  618
1312 02  9 16 65 19.3333    1.2500  0.1200  0.1500  0.1500  0.1500  1.8800     0  P29  619
1312 02  9 24 65  5.1167  177.7833  0.0000  0.0000  0.0000  0.0000  1.8800     0  P29  620
1312 02  9 24 65  5.5000    0.3834  0.4174  0.1600  0.1600  0.1600  2.0400     0  P29  621
1312 02  9 24 65 13.7500    8.2500  0.0000  0.0000  0.0000  0.1600  2.0400     0  P29  622
1312 02  9 24 65 13.8167    0.0667  1.0503  0.0700  0.0700  0.2300  2.1100     0  P29  623
1312 02  9 24 65 13.8500    0.0333  3.3008  0.1100  0.1800  0.3400  2.2200     0  P29  624
1312 02  9 24 65 13.9167    0.0667  1.0503  0.0700  0.2500  0.4100  2.2900     0  P29  625
1312 02  9 24 65 13.9833    0.0667  1.5004  0.1000  0.3500  0.5100  2.3900     0  P29  626
1312 02  9 24 65 14.0833    0.1000  0.0000  0.0000  0.3500  0.5100  2.3900     0  P29  627
1312 02  9 24 65 14.1000    0.0167  9.0022  0.1500  0.5000  0.6600  2.5400     0  P29  628
1312 02  9 24 65 14.1833    0.0833  1.5604  0.1300  0.6300  0.7900  2.6700     0  P29  629
1312 02  9 24 65 14.2167    0.0333  3.6009  0.1200  0.7500  0.9100  2.7900     0  P29  630
1312 02  9 24 65 14.2667    0.0500  1.3986  0.0700  0.8200  0.9800  2.8600     0  P29  631
1312 02  9 24 65 14.3167    0.0500  2.2005  0.1100  0.9300  1.0900  2.9700     0  P29  632
1312 02  9 24 65 15.2000    0.8833  0.0113  0.0100  0.9400  1.1000  2.9800     0  P29  633
1312 02  9 24 65 15.4000    0.2000  0.1500  0.0300  0.9700  1.1300  3.0100     0  P29  634
1312 02  9 24 65 15.7333    0.3333  0.0900  0.0300  1.0000  1.1600  3.0400     0  P29  635
1312 02  9 24 65 15.9167    0.1833  0.0545  0.0100  1.0100  1.1700  3.0500     0  P29  636
1312 02  9 24 65 16.5000    0.5834  0.0171  0.0100  1.0200  1.1800  3.0600     0  P29  637
1312 02  9 24 65 16.7000    0.2000  0.1500  0.0300  1.0500  1.2100  3.0900     0  P29  638
1312 02  9 24 65 16.9500    0.2500  0.0400  0.0100  1.0600  1.2200  3.1000     0  P29  639
1312 02  9 24 65 17.4667    0.5167  0.0194  0.0100  1.0700  1.2300  3.1100     0  P29  640
1312 02  9 24 65 18.0833    0.6167  0.0649  0.0400  1.1100  1.2700  3.1500     0  P29  641
1312 02  9 24 65 18.8333    0.7500  0.0533  0.0400  1.1500  1.3100  3.1900     0  P29  642
1312 02  9 24 65      29    5.2800  3.0480  2.6800  2.3208  1.7434  1.7200     9  P29  643
1312 02  9 24 65      29    0.9349  0.5005  0.2721  0.0000  0.0000  0.0000     9  P29  644
1312 02  9    65           24.4833                                  3.1900     6  P29  645
1312 02 10  1 65  1.5000  150.6667  0.0000  0.0000  0.0000  0.0000  0.0000     0  P29  646
1312 02 10  1 65  5.8333    4.3333  0.0277  0.1200  0.1200  0.1200  0.1200     0  P29  647
1312 02 10  1 65 10.0000    4.1667  0.0000  0.0000  0.0000  0.1200  0.1200     0  P29  648
         .                                                                  .
         .                                                                  .
         .                                                                  .
1312 02 11 27 65  7.9167  118.9166  0.0000  0.0000  0.0000  0.0000  0.6600  E  0  P29  713
1312 02 11 27 65  8.5000    0.5834  0.0343  0.0200  0.0200  0.0200  0.6800  E  0  P29  714
1312 02 11    65           22.1667                                  0.6800     6  P29  715
1312 02 12  6 65  8.0000  215.5000  0.0000  0.0000  0.0000  0.0000  0.0000  E  0  P29  716
1312 02 12  6 65  9.0000    1.0000  0.0100  0.0100  0.0100  0.0100  0.0100  E  0  P29  717
1312 02 12 11 65  3.5000  114.5000  0.0000  0.0000  0.0000  0.0000  0.0100  E  0  P29  718
1312 02 12 11 65  4.0000    0.5000  0.0200  0.0100  0.0100  0.0100  0.0200  E  0  P29  719
1312 02 12 13 65  0.5000   44.5000  0.0000  0.0000  0.0000  0.0000  0.0200     0  P29  720
1312 02 12 13 65  5.0000    4.5000  0.0400  0.1800  0.1800  0.1800  0.2000     0  P29  721
1312 02 12 20 65 22.5000  185.5000  0.0000  0.0000  0.0000  0.0000  0.2000     0  P29  722
1312 02 12 20 65 24.0000    1.5000  0.0067  0.0100  0.0100  0.0100  0.2100     0  P29  723
1312 02 12 21 65  1.0000    1.0000  0.0100  0.0100  0.0200  0.0100  0.2200     0  P29  724
1312 02 12 21 65  2.0000    1.0000  0.0000  0.0000  0.0000  0.0100  0.2200     0  P29  725
1312 02 12 21 65  3.0000    1.0000  0.0100  0.0100  0.0100  0.0200  0.2300     0  P29  726
1312 02 12 25 65  5.7500   98.7500  0.0000  0.0000  0.0000  0.0000  0.2300  E  0  P29  727
1312 02 12 25 65  8.0000    2.2500  0.0222  0.0500  0.0500  0.0500  0.2800  E  0  P29  728
1312 02 12 25 65 12.5000    4.5000  0.0000  0.0000  0.0000  0.0500  0.2800  E  0  P29  729
1312 02 12 25 65 13.2500    0.7500  0.2267  0.1700  0.1700  0.2200  0.4500  E  0  P29  730
1312 02 12    65           12.5000                                  0.4500     6  P29  731
1312 02       65          405.6670                                 28.8100     7  P29  732
1312 02       65            5.2800  3.3600  2.6800  2.3208  1.7434  1.7200     3  P29  733
1312 02       65            0.9349  0.5005  0.2857  0.2661  0.2217  0.0000     3  P29  734
 999                                                                           2  P29  735
```

*The numbers in parentheses refer to the print position of the respective data fields. See section - Utility Unit S.SUOO Output Format - for an explanation of the data contained in each column.

KODE = 2 (end of record).--

2-7	16-19	75-77	125-129
+XXXXX	+ XXX	XXX	+XXXX
NUM	NRECD	KUPDAT	KODE

KODE = 3 (maximum intensities).--Two lines of data for maximum intensities for the period of record covered by each set of data processed (usually a complete year). Data format for KODE = 3 is the same as for KODE = 9, except for print positions 11-36, refer to lines 733-734 table A5.

KODE = 6 (monthly summary).--

2-7	11-12	16-19	20-24	29-31	58-68	115-124	125-129
+XXXXX	XX	XXXX	+XXXX	+XX	+XXXXX.XXXX	+XXXX.XXXX	+XXXX
NUM	IGAGE	IWID	MONTHO	NYEAR	ACTI	AMAC	KODE

KODE = 7 (yearly summary).--

2-7	11-12	16-19	29-31	58-68	115-124	125-129
+XXXXX	XX	XXXX	+XX	+XXXXX.XXXX	+XXXX.XXXX	+XXXX
NUM	IGAGE	IWID	NYEAR	ACTIYR	YRAC	KODE

KODE = 9 (maximum intensity for individual storms).--

2-7	11-12	16-19	20-24	25-28	29-31	32-36
+XXXXX	XX	XXXX	+ XXXX	+ XXX	+ XX	+XXXX
NUM	IGAGE	IWID	MONTH	NDAY	NYEAR	NRO
NUMA	IGAGE	IWID	MONTH	NDAY	NYEAR	NRO

58-68	69-79	80-90	91-102	103-114
+XXXXX.XXXX	+XXXXX.XXXX	+XXXXX.XXXX	+XXXXXXX.XXXX	+XXXXXXX.XXXX
PI(1)	PI(2)	PI(3)	PI(4)	PI(5)
PI(7)	PI(8)	PI(9)	PI(10)	PI(11)

115-124	125-129
+XXXXX.XXXX	+XXXX
PI(6)	KODE
PI(12)	KODE

Note: There are two lines of KODE = 9 output for each storm ≧ 0.25 inch. The data contained in each are the same except for positions 58-124 (S.SU06).

Error.--If a negative time interval is encountered during processing, the numbers of the two data cards causing this error are written on S.SU06 only, then normal processing is continued with the next data card. The information contained in the error output is as follows:

11-12	16-19	22-24	26-28	29-31	46-57
XX	XXXX	+XX	+XX	+XX	+XXXXXX.XXXX
IGAGE	IWID	MONTH	NDAY	NYEAR	HR

58-110	112-117	118-121	123-127
(See note below)	+XXXXX	(See note)	+XXXXX
	KSEQ		KSEQO

Note: Print positions 58-110 contain: (NEGATIVE OR ZERO TIME INTERVAL BETWEEN CARD NUMBERS.)

Print positions 118-121 contain: AND.

UTILITY UNIT S.SU00 Output Format (Permanent Storage)

The data are placed on magnetic tape for permanent storage in a 90-column card image as indicated by the formats listed below. These same numbers refer to print positions if the data are listed by the IBM 1401 (see table A6).

KODE = 0 (line of basic data).--

1-4	6-7	8-10	11-13	14-16	17-24	25-34
XXXX	XX	+XX	+XX	+XX	+XX.XXXX	+XXXX.XXXX
IWID	IGAGE	MONTH	NDAY	NYEAR	HR	TI

35-42	43-50	51-58	59-66	67-74	77
+XX.XXXX	+XX.XXXX	+XX.XXXX	+XX.XXXX	+XX.XXXX	X
AI	ACP	STAC	DAC	AMAC	LTYPRE

78-80	83-85	86-90
+XX	XXX	+XXXX
KODE	KUPDAT	NUM

KODE = 2 (end of record).--

1-4	78-80	83-85	86-90
+XXX	+XXX	XXX	+ XXXX
NRECD	KODE	KUPDAT	NUM

KODE = 3 (maximum intensities).--Two lines of data for maximum intensities for the period of record covered by each set of data processed (usually a complete year). Data format for KODE = 3 is the same as for KODE = 9, except storm number NRO (20-24) is omitted.

KODE = 6 (monthly summary).--

1-4	6-7	8-10	14-16	25-34	67-74	75-80
XXXX	XX	+XX	+XX	+XXXX.XXXX	+XX.XXXX	+XXXXX
IWID	IGAGE	MONTHO	NYEAR	ACTI	AMAC	KODE

83-85	86-90
XXX	+XXXX
KUPDAT	NUM

KODE = 7 (yearly summary).--

1-4	6-7	14-16	25-34	67-74	75-80	83-85	86-90
XXXX	XX	+XX	+XX.XXXX	+XX.XXXX	+XXXXX	XXX	+XXXX
IWID	IGAGE	NYEAR	ACTIYR	YRAC	KODE	KUPDAT	NUM

KODE = 9 (maximum intensities for individual storms).--

1-4	6-7	8-10	11-13	14-16	20-24
XXXX	XX	+XX	+XX	+XX	+XXXX
IWID	IGAGE	MONTH	NDAY	NYEAR	NRO
IWID	IGAGE	MONTH	NDAY	NYEAR	NRO

25-34	35-42	43-50	51-58	59-66	67-74	78-80
+XXXX.XXXX	+XX.XXXX	+XX.XXXX	+XX.XXXX	+XX.XXXX	+XX.XXXX	+XX
PI(1)	PI(2)	PI(3)	PI(4)	PI(5)	PI(6)	KODE
PI(7)	PI(8)	PI(9)	PI(10)	PI(11)	PI(12)	KODE

83-85	86-90
XXX	+XXXX
KUPDAT	NUM
KUPDAT	NUMA

Note: There are two lines of KODE = 9 output for each storm $\geqq 0.25$ inch. The data contained in each are the same except positions 25-74 (S.SU00).

PROGRAM B (RUNOFF REDUCTION PROGRAM)

Program B determines instantaneous discharge rates from simultaneous readings of stage and time. All computations, including pondage corrections where applicable, flow-duration summaries, and maximum volume search, are performed as each stage and time increment is read.

The following summaries are made:

1. The runoff hydrograph is numerically integrated to give runoff volumes summarized by day, month, and year.
2. Maximum volumes are determined for seven selected time intervals.

3. The maximum peak discharge is determined for the year.
4. Five flow-duration summaries are determined for each month and for the year.
5. The data are checked for negative time increments.

A listing of the source program and detailed description of the Fortran variables are given in appendix lists B1 and B2, respectively.

Program Constants

Three storage areas are reserved for program constants by specific programming routines during the initiation phase of the program. These storage areas are: M(I), I = 1, 12; MHR(I), I = 1, 12 and AMHR(I), I = 1, 12. Table B1 gives specific values for these constants.

TABLE B1.--Runoff reduction program constants

[Where two values are given, the second value refers to leap year]

I	M(I)	MHR(I)	AMHR(I)	I	M(I)	MHR(I)	AMHR(I)
	Days	Hours	Hours		Days	Hours	Hours
1 -----	31	744	744	7 -----	31	5088; 5112	744
2 -----	28; 29	1416; 1440	672; 696	8 -----	31	5832; 5856	744
3 -----	31	2160; 2184	744	9 -----	30	6552; 6576	720
4 -----	30	2880; 2904	720	10 -----	31	7296; 7320	744
5 -----	31	3624; 3648	744	11 -----	30	8016; 8040	720
6 -----	30	4344; 4368	720	12 -----	31	8760; 8784	744

Input

The input data are read from standard 80-column punchcards and transferred to magnetic tape by an IBM 1401 data processing machine for subsequent reduction by the IBM 7040 computer.

The input consists of the following cards:

1. Basic constants.
2. Parameter card.
3. Rating and pondage tables.
4. Basic data cards (stage-time readings).
5. Trailer card.

A typical runoff event is shown in figure B1 to illustrate data preparation. The coordinate points, which are indicated by the tic marks, are tabulated on the runoff code sheet given in table B2. A midnight coordinate point (2400 hours) must be used for all days during which runoff occurs. These data may be key-punched from this code sheet with each data field punched in the position indicated under the respective column headings.

Basic Constants

The following basic constants are required:

1. Flow-duration limits.
2. Time intervals for maximum volume search.
3. Rating and pondage table conversion factors.

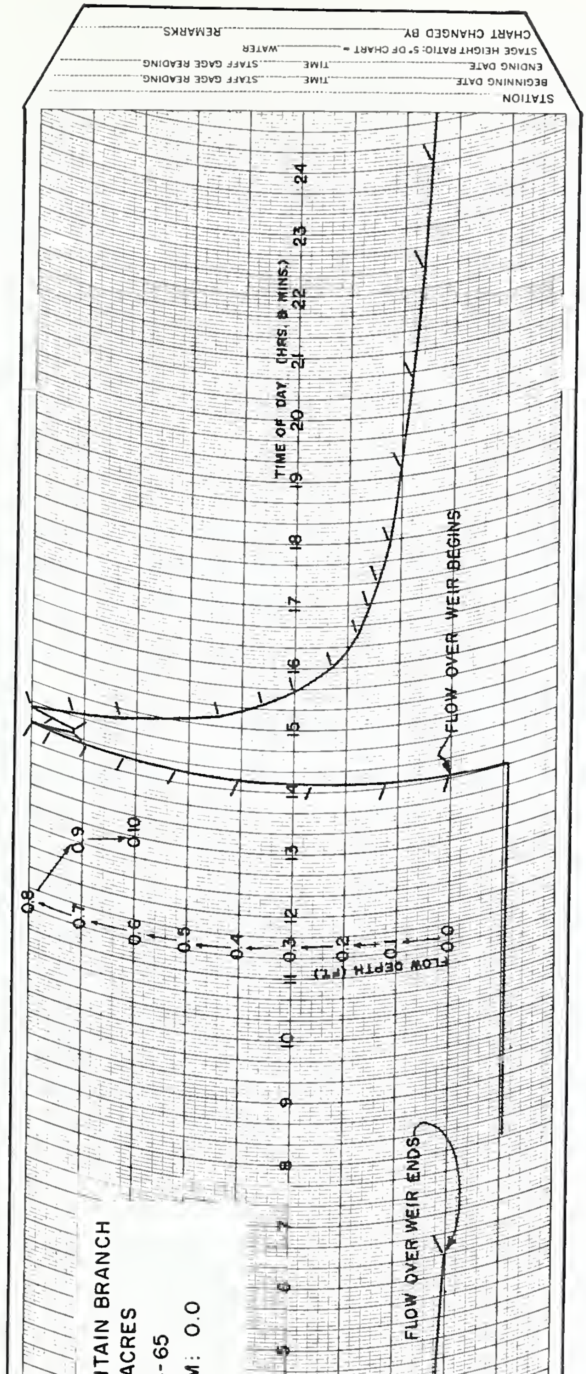


Figure B1.--Example of a runoff event.

TABLE B2. -- Code sheet for recording runoff data (input for program B)

Location Pony Mt. Br. Sheet 1 Of 1

IW		IDW		MONTH		NDAY		NYEAR		HR		AM		HT				NEST	NEND		NTCH	KUP			KSEQ				
1	2	3	4	5	6	7	8	9	10	11	12	21	22	31	32	33	34	35	50	51	60	73	74	75	76	77	78	79	80
1	3	1	2	0	9	2	4	6	5	1	4	0	4			0	0					Q	1	2					1
1	3	1	2	0	9	2	4	6	5	1	4	0	6			1	2					Q	1	2					2
1	3	1	2	0	9	2	4	6	5	1	4	0	8			2	6					Q	1	2					3
1	3	1	2	0	9	2	4	6	5	1	4	1	0			4	0					Q	1	2					4
1	3	1	2	0	9	2	4	6	5	1	4	1	2			5	2					Q	1	2					5
1	3	1	2	0	9	2	4	6	5	1	4	1	4			6	2					Q	1	2					6
1	3	1	2	0	9	2	4	6	5	1	4	1	6			7	0					Q	1	2					7
1	3	1	2	0	9	2	4	6	5	1	4	1	8			7	6					Q	1	2					8
1	3	1	2	0	9	2	4	6	5	1	4	2	0			8	2					Q	1	2					9
1	3	1	2	0	9	2	4	6	5	1	4	2	2			8	7					Q	1	2				1	0
1	3	1	2	0	9	2	4	6	5	1	4	2	4			8	9					Q	1	2				1	1
1	3	1	2	0	9	2	4	6	5	1	4	2	7			8	9					Q	1	2				1	2
1	3	1	2	0	9	2	4	6	5	1	4	3	2			8	4					Q	1	2				1	3
1	3	1	2	0	9	2	4	6	5	1	4	3	6			8	0					Q	1	2				1	4
1	3	1	2	0	9	2	4	6	5	1	4	4	2			7	2					Q	1	2				1	5
1	3	1	2	0	9	2	4	6	5	1	4	4	9			6	2					Q	1	2				1	6
1	3	1	2	0	9	2	4	6	5	1	5	0	0			5	2					Q	1	2				1	7
1	3	1	2	0	9	2	4	6	5	1	5	1	0			4	4					Q	1	2				1	8
1	3	1	2	0	9	2	4	6	5	1	5	2	4			3	6					Q	1	2				1	9
1	3	1	2	0	9	2	4	6	5	1	5	4	0			3	0					Q	1	2				2	0
1	3	1	2	0	9	2	4	6	5	1	6	0	0			2	5					Q	1	2				2	1
1	3	1	2	0	9	2	4	6	5	1	6	3	6			1	8					Q	1	2				2	2
1	3	1	2	0	9	2	4	6	5	1	7	2	0			1	4					Q	1	2				2	3
⋮			⋮				⋮			⋮							⋮						⋮						⋮
⋮			⋮				⋮			⋮							⋮						⋮						⋮
1	3	1	2	0	9	2	4	6	5	2	2	1	2			0	6					Q	1	2				2	7
1	3	1	2	0	9	2	4	6	5	2	4	0	0			0	5					Q	1	2				2	8
1	3	1	2	0	9	2	5	6	5	0	2	0	0			0	3					Q	1	2				2	9
1	3	1	2	0	9	2	5	6	5	0	3	3	6			0	2					Q	1	2				3	0
1	3	1	2	0	9	2	5	6	5	0	6	2	0			0	0					Q	1	2				3	1
1	3	1	2	0	9	2	5	6	5	2	4	0	0			0	0					Q	1	2				3	2
1	3	1	2	1	3	3	1	6	5										9	9		Q	1	2				3	3

Tabulated by_ Checked by______

Flow Duration

Flow duration is obtained as a percentage of the time that the discharge rate was equal to or exceeded given base rates. Consequently, a range of base rates is needed that will best reflect the watershed flow-duration curve. Different areas will normally require a different set of values; however, values ranging from 0.00001 to 0.50000 inch per hour have been found to adequately define the flow duration curve for the watersheds being studied at Blacksburg, Va. Twenty-five rates may be placed in five cards according to the following format. Note that there will be five cards, with five values per card with decimal positions not punched.

1-6	7-12	13-18	19-24	25-30
X.XXXXX	X.XXXXX	X.XXXXX	X.XXXXX	X.XXXXX
FLOW(I)	FLOW(I+1)	FLOW(I+2)	FLOW(I+3)	FLOW(I+4)

Maximum Volume

Maximum volumes are determined for selected time intervals of 1, 2, 6, and 12 hours, and 1, 2, and 8 days. One card containing these respective time intervals in minutes is required in the following format. Decimals are not punched.

1-5	6-10	11-15	16-20	21-25	26-30	31-35
XXXXX.	XXXXX.	XXXXX.	XXXXX.	XXXXX.	XXXXX.	XXXXX.
VOLM(I)	VOLM(I+1)	VOLM(I+2)	VOLM(I+3)	VOLM(I+4)	VOLM(I+5)	VOLM(I+6)

Conversion Factors

Two conversion factors for each watershed are required to convert the basic rating and pondage tables to the desired units. The program has been designed to load 15 conversion factors for subsequent analysis. Blank cards must be inserted for the missing conversion factors when the number of watersheds being analyzed is less than 15. Since ID1 is used to index RRAT and RPOND, each blank card must contain a two-digit integer that is greater than zero but less than or equal to 15. The same integer may be used for all blank cards. However, the value chosen must not be equal to any of the values previously used to index corresponding conversion factors. The conversion factors are punched according to the following format. Decimals are not punched.

1-2	3-12	13-22
XX	.XXXXXXXXXX	.XXXXXXXXXX
ID1	RPOND(ID1)	RRAT(ID1)

Parameter Card

The parameter card contains program control data. See input section of appendix list B2 for a discussion of the type of control obtained from the coding of this card. The required form is:

1	2	3	4	5
X	X	X	X	X
NBR	J3	J4	J6	J7

Rating Table

The rating table consists of stage-discharge (coordinates) that have been selected from the rating curve for the record being processed at intervals sufficiently close to allow linear interpolations between two stage readings. The maximum number of coordinate points that may be loaded may be varied by changing the dimension of GAGR and CFSR. In this program a maximum of 170 points may be stored. One coordinate point is placed on each card. This procedure may be altered by changing the input format in the rating table load routine.

1-4	11-20	80
XX.XX	XXXX.XXXXXX	X
GAGR(I)	CFSR(I)	JEND

Pondage

The pondage table consists of stage-ponded area coordinates selected at intervals sufficiently close to allow linear interpolation for intermediate points. This program will load a maximum of 50 coordinate points for pondage corrections. Additional capacity may be obtained by increasing the dimension of GAGP and CFSP.

When selecting coordinate points, the first point must be at the datum plane. One coordinate point is placed on each card as follows:

1-4	11-15	80
XX.XX	XXX.XX	X
GAGP(I)	CFSP(I)	JEND

Basic Data Cards

The following shows the information required and the input data card format:

1-2	3-4	5-6	7-8	9-10	11-12	21-22	31-34	35
XX	XX	XX	XX	XX	XX.	XX.	XX.XX	X
IW	IDW	MONTH	NDAY	NYEAR	HR	AM	HT	NEST

50-51	60	73-75	76-80
XX	X	XXX	XXXXX
NEND	NTCH	KUP	KSEQ

See input section appendix list B1 for a description of symbols.

Trailer Card

The trailer card contains code information that will terminate the station processing and complete year-end summaries.

1-2	3-4	5-6	7-8	9-10	50-51	73-75	76-80
XX	XX	XX	XX	XX	XX	XXX	XXXXX
IW	IWD	MONTH	NDAY	NYEAR	NEND	KUP	KSEQ

Note: Always place a 13 in columns 5-6 and a 31 in columns 7-8. See input section of appendix list B1 for description of the remaining symbols.

Codes

The coding necessary for correct program execution is found in the input section of appendix list B2 and is as follows:

1. Parameter card.
2. NEND.
3. NEST.
4. NTCH.
5. KUP.

Table B3 gives KUP values being used at Blacksburg, Va.; the selection of KUP for a particular watershed is arbitrary, except that no two watersheds may have the same KUP identification.

TABLE B3.--KUP values, Blacksburg, Va.

Location	Watershed identification (IWID)	KUP	Location	Watershed identification (IWID)	KUP
Moorefield, W. Va.--------	6601	Q01	Powells Creek, Va.--------	1309	Q09
Do ----------------	6602	Q02	Little Winns Creek, Va.-----	1310	Q10
Do ----------------	6604	Q04	Rocky Run Branch, Va. -----	1311	Q11
Do ----------------	6605	Q05	Pony Mountain Branch, Va. --	1312	Q12
Thorne Creek, Va. --------	1306	Q06	Chub Run, Va. -----------	1313	Q13
Crab Creek, Va.----------	1307	Q07	Fosters Creek, Va.--------	1314	Q14
Brush Creek, Va.---------	1308	Q08	Chestnut Branch, Va. ------	1315	Q15

Order of Input

Input cards are stacked in the following order:

1. Control cards specified by computer residence.
2. Object program.
3. Flow-duration table (5 cards).
4. Time intervals for maximum volume search (1 card).
5. Parameter data (1 card).
6. Conversion factors when required (15 cards).
7. Pondage table when required (max. 50 cards).
8. Rating table when required (max. 170 cards).
9. Basic data.
10. Trailer card.
11. Repeat steps 5-10 where appropriate.

A typical stacking order for the IBM 7040/1401 installation at Virginia Polytechnic Institute, Blacksburg, Va., is illustrated in Figure B2.

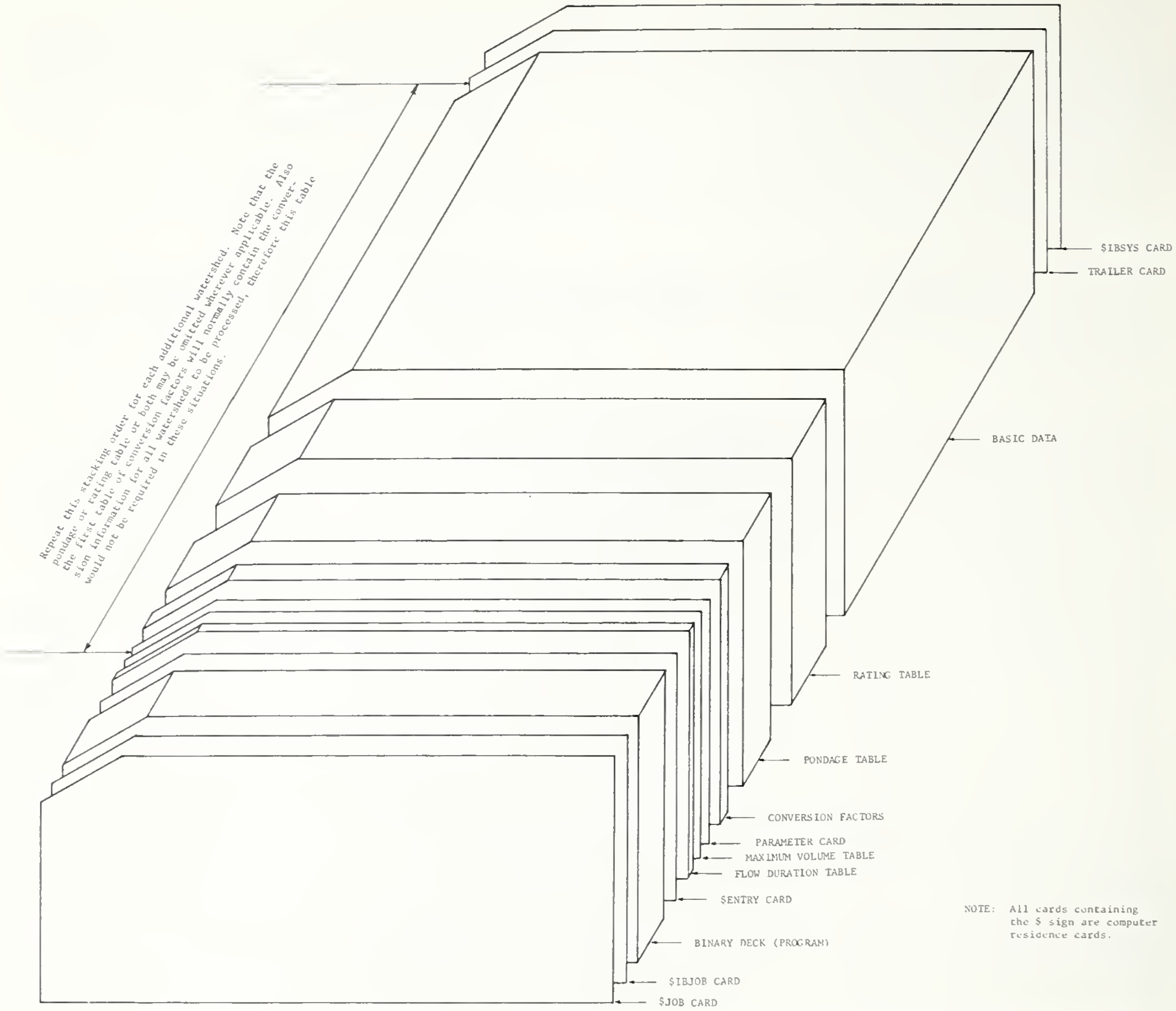

Repeat this stacking order for each additional watershed. Note that the pondage or rating table or both may be omitted wherever applicable. Also the first table of conversion factors will normally contain the conversion information for all watersheds to be processed, therefore this table would not be required in these situations.
$IBSYS CARD
TRAILER CARD
BASIC DATA
RATING TABLE
PONDAGE TABLE
CONVERSION FACTORS
PARAMETER CARD
MAXIMUM VOLUME TABLE
FLOW DURATION TABLE
$ENTRY CARD
BINARY DECK (PROGRAM)
$IBJOB CARD
$JOB CARD
NOTE: All cards containing the $ sign are computer residence cards.

Figure B2.--Schematic diagram illustrating the stacking order for the input data required by program B. The computer residence cards are those required by the IBM 7040/1401 installation at Virginia Polytechnic Institute, Blacksburg, Va.

Output

The output is placed on magnetic tape by utility units S.SU00 for permanent storage and S.SU06 for listing and temporary storage. The data from S.SU06 contain page numbers, column identification, and basic output data, which will result in the format illustrated by tables B4 and B5 when listed by the IBM 1401. The first page of output (table B4) consists of the parameter data used for the reduction of the basic runoff data. This output has no page number and is not placed on the permanent storage tape. When the permanent storage tape is listed, the result is the format given in table B6. As in program A, note that both listings contain the same basic data and corresponding sequence numbers.

Each output tape includes the following output summaries:

1. A list of the basic constants used for the given analysis (see table B4). These data precede all output.
2. One line of data for each input card.

TABLE B4. -- PARAMETER DATA USED IN RUNOFF REDUCTION ANALYSES

```
                      RUNOFF COMPUTATIONS'WATERSHED ENGINEERING'BLACKSBURG,VA.

BASIC CONSTANTS USED FOR ANALYSES

BASE FLOW DURATION RATES
 0.00001 0.00010 0.00020 0.00050 0.00075
 0.00100 0.00150 0.00200 0.00300 0.00400
 0.00500 0.00750 0.01000 0.01500 0.02000
 0.02500 0.03000 0.03500 0.04000 0.05000
 0.07500 0.10000 0.25000 0.40000 0.50000

MAXIMUM VOLUME LIMITS(MINUTES)
    60.   120.   360.   720.  1440.  2880. 11520.

PARAMETER DATA
NBR= 2 J3= 2 J4= 2 J6= 2 J7= 2

RATING AND PONDAGE CORRECTION FACTORS
    1      -0.00000000      0.11566000
    2      -0.00000000      0.10169000
    3      -0.00000000     -0.00000000
    4      -0.00000000      0.15692089
    5      -0.00000000      0.10364712
    6       0.00001804      0.00032473
    7       0.00007010      0.00126175
    8       0.00024679      0.00111057
    9       0.00030273      0.00544912
   10       0.00023409      0.00067419
   11       0.00009927      0.00178630
   12       0.00064566      0.00517105
   13       0.00002724      0.00049023
   14       0.00056627      0.00254825
   15       0.00005210      0.00093772
```

TABLE B5. -- 1965 RUNOFF OUTPUT IN ABBREVIATED FORM FOR PONY MOUNTAIN BRANCH WATERSHED, CULPEPER, VIRGINIA. FORMAT FOR LISTING BY IBM 1401 ONLY (S.SU06)

```
                                                                                                                                     PAGE   1
                                            RUNOFF COMPUTATIONS'WATERSHED ENGINEERING'BLACKSBURG,VA.

WSHED    DATE      TIME OF GAGE HT  TIME INT  OUTFLOW RATE     POND      RUNOFF RATE  AVG RO RATE  RO TIME  ACCUM DA  ACCUM MO  ACCUM YR      SEQ.
 NO.   MO DA YR     DAY    (FT.)    (HRS.)     (IN/HR)        CORR       (IN/HR)      (IN/HR)   INT(IN)   RO(IN.)   RO(IN.)   RO(IN.) CODE  NO.
 1312  1  1 65   0.0000   0.11    0.0000   0.00017   0.00000000    0.00017    0.000172   0.00000   0.00000   0.00000   0.00000   0    1
 1312  1  1 65   1.3333   0.11    1.3333   0.00017  -0.00000022    0.00017    0.000172   0.00023   0.00023   0.00023   0.00023   0    2
 1312  1  1 65  14.0000   0.10   12.6667   0.00013   0.00000144    0.00013    0.000153   0.00194   0.00217   0.00217   0.00217   0    3
 1312  1  1 65  15.6667   0.11    1.6667   0.00017   0.00000446    0.00018    0.000155   0.00026   0.00243   0.00243   0.00243   0    4
 1312  1  1 65  16.6667   0.12    1.0000   0.00022   0.00000281    0.00022    0.000198   0.00020   0.00263   0.00263   0.00263   0    5
 1312  1  1 65  20.6667   0.12    4.0000   0.00022   0.00000281    0.00022    0.000220   0.00088   0.00351   0.00351   0.00351   0    6
 1312  1  1 65  21.6667   0.13    1.0000   0.00027   0.00000613    0.00028    0.000249   0.00025   0.00376   0.00376   0.00376   0    7
 1312  1  1 65  22.2000   0.14    0.5333   0.00033   0.00001144    0.00034    0.000310   0.00017   0.00392   0.00392   0.00392   0    8
 1312  1  1 65  22.6667   0.15    0.4667   0.00040   0.00001473    0.00041    0.000377   0.00018   0.00410   0.00410   0.00410   0    9
 1312  1  1 65  23.0000   0.16    0.3333   0.00047   0.00000865    0.00048    0.000447   0.00015   0.00425   0.00425   0.00425   0   10
 1312  1  1 65  23.5333   0.16    0.5333   0.00047   0.00000618    0.00048    0.000481   0.00026   0.00450   0.00450   0.00450   0   11
 1312  1  1 65  24.0000   0.17    0.4667   0.00056   0.00000622    0.00056    0.000521   0.00024   0.00475   0.00475   0.00475   0   12
 1312  1  1 65                                                                0.000198             0.00475             0.00475   7   13
 1312  1  2 65   0.6667   0.17    0.6667   0.00056  -0.00000311    0.00055    0.000559   0.00037   0.00037   0.00512   0.00512   0   14
 1312  1  2 65   1.6000   0.16    0.9333   0.00047  -0.00000309    0.00047    0.000512   0.00048   0.00085   0.00560   0.00560   0   15
 1312  1  2 65   2.1333   0.16    0.5333   0.00047   0.00000541    0.00048    0.000474   0.00025   0.00110   0.00585   0.00585   0   16
 1312  1  2 65   2.6667   0.17    0.5333   0.00056   0.00001415    0.00057    0.000525   0.00028   0.00138   0.00613   0.00613   0   17
 1312  1  2 65   3.3333   0.19    0.6667   0.00075   0.00001433    0.00077    0.000669   0.00045   0.00183   0.00658   0.00658   0   18
 1312  1  2 65   3.8667   0.20    0.5333   0.00086   0.00000555    0.00087    0.000818   0.00044   0.00227   0.00701   0.00701   0   19
 1312  1  2 65   4.3333   0.20    0.4667   0.00066  -0.00000222    0.00086    0.000866   0.00040   0.00267   0.00742   0.00742   0   20
 1312  1  2 65   7.0000   0.18    2.6667   0.00065  -0.00000438    0.00065    0.000754   0.00201   0.00468   0.00943   0.00943   0   21
 1312  1  2 65   8.3333   0.17    1.3333   0.00056  -0.00000218    0.00056    0.000601   0.00080   0.00548   0.01023   0.01023   0   22
 1312  1  2 65   9.1667   0.17    0.8333   0.00056   0.00000390    0.00056    0.000556   0.00047   0.00595   0.01069   0.01069   0   23
 1312  1  2 65  11.4000   0.20    2.2333   0.00086   0.00000398    0.00087    0.000715   0.00160   0.00754   0.01229   0.01229   0   24
 1312  1  2 65  14.0000   0.20    2.6000   0.00086  -0.00000197    0.00066    0.000865   0.00225   0.00979   0.01454   0.01454   0   25
 1312  1  2 65  17.0000   0.18    3.0000   0.00065  -0.00000298    0.00065    0.000755   0.00226   0.01206   0.01681   0.01681   0   26
 1312  1  2 65  22.6667   0.16    5.6667   0.00047  -0.00000318    0.00047    0.000559   0.00317   0.01522   0.01997   0.01997   0   27
 1312  1  2 65  24.0000   0.15    1.3333   0.00040  -0.00000215    0.00040    0.000433   0.00058   0.01580   0.02055   0.02055   0   28
 1312  1  2 65                                                                0.000658             0.01580             0.02055   7   29
 1312  1  3 65   2.0000   0.15    2.0000   0.00040  -0.00000096    0.00040    0.000396   0.00079   0.00079   0.02134   0.02134   0   30
 1312  1  3 65   5.0000   0.14    3.0000   0.00033  -0.00000190    0.00033    0.000362   0.00109   0.00188   0.02243   0.02243   0   31
 1312  1  3 65  11.0000   0.12    6.0000   0.00022  -0.00000143    0.00022    0.000272   0.00163   0.00351   0.02406   0.02406   0   32
 1312  1  3 65  16.6667   0.11    5.6667   0.00017  -0.00000049    0.00017    0.000194   0.00110   0.00461   0.02516   0.02516   0   33
 1312  1  3 65  20.3333   0.11    3.6667   0.00017  -0.00000076    0.00017    0.000171   0.00063   0.00524   0.02579   0.02579   0   34
 1312  1  3 65  24.0000   0.10    3.6667   0.00013  -0.00000076    0.00013    0.000152   0.00056   0.00580   0.02634   0.02634   0   35
 1312  1  3 65                                                                0.000241             0.00580             0.02634   7   36
 1312  1  4 65   5.6667   0.10    5.6667   0.00013  -0.00000055    0.00013    0.000132   0.00075   0.00075   0.02709   0.02709   0   37
 1312  1  4 65  10.6667   0.09    5.0000   0.00010   0.00000358    0.00010    0.000118   0.00059   0.00134   0.02768   0.02768   0   38
 1312  1  4 65  12.0000   0.11    1.3333   0.00017   0.00000418    0.00018    0.000140   0.00019   0.00153   0.02787   0.02787   0   39
 1312  1  4 65  18.0000   0.11    6.0000   0.00017  -0.00000046    0.00017    0.000174   0.00104   0.00257   0.02891   0.02891   0   40
 1312  1  4 65  24.0000   0.10    6.0000   0.00013  -0.00000115    0.00013    0.000152   0.00091   0.00348   0.02982   0.02982   0   41
 1312  1  4 65                                                                0.000145             0.00348             0.02982   7   42
 1312  1  5 65   4.0000   0.09    4.0000   0.00010  -0.00000124    0.00010    0.000115   0.00046   0.00046   0.03029   0.03029   0   43
 1312  1  5 65   9.0000   0.08    5.0000   0.00007   0.00000219    0.00008    0.000087   0.00043   0.00090   0.03072   0.03072   0   44
 1312  1  5 65  13.0000   0.12    4.0000   0.00022   0.00000281    0.00022    0.000148   0.00059   0.00149   0.03131   0.03131   0   45
 1312  1  5 65  14.6667   0.12    1.6667   0.00022  -0.00000077    0.00022    0.000219   0.00036   0.00185   0.03168   0.03168   0   46
 1312  1  5 65  18.3333   0.11    3.6667   0.00017  -0.00000169    0.00017    0.000194   0.00071   0.00256   0.03239   0.03239   0   47
 1312  1  5 65  21.3333   0.10    3.0000   0.00013  -0.00000196    0.00013    0.000151   0.00045   0.00301   0.03284   0.03284   0   48
 1312  1  5 65  24.0000   0.09    2.6667   0.00010  -0.00000136    0.00010    0.000115   0.00031   0.00332   0.03314   0.03314   0   49
 1312  1  5 65                                                                0.000138             0.00332             0.03314   7   50
 1312  1  6 65   8.0000   0.08    8.0000   0.00007  -0.00000034    0.00007    0.000086   0.00068   0.00068   0.03383   0.03383   0   51
 1312  1  6 65   9.3333   0.08    1.3333   0.00007   0.00000164    0.00007    0.000073   0.00010   0.00078   0.03393   0.03393   0   52
```

TABLE B5. -- CONTINUED

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                                                                                                                          PAGE 28
                                          RUNOFF COMPUTATIONS'WATERSHED ENGINEERING'BLACKSBURG,VA.

WSHED    DATE    TIME OF GAGE HT TIME INT OUTFLOW RATE    POND     RUNOFF RATE  AVG RO RATE RO TIME  ACCUM DA ACCUM MO ACCUM YR     SEQ.
 NO.  MO DA YR    DAY    (FT.)   (HRS.)     (IN/HR)      CORR       (IN/HR)      (IN/HR)   INT(IN)  RO(IN.)  RO(IN.)  RO(IN.) CODE NO.
1312  8  2 65  2.2667   0.13     0.0667    0.00027  -0.00002121    0.00025     0.000281  0.00002  0.07848  0.07848  6.41101  0  1336
1312  8  2 65  2.4000   0.12     0.1333    0.00022  -0.00003511    0.00018     0.000216  0.00003  0.07851  0.07851  6.41104  0  1337
1312  8  2 65  3.0000   0.09     0.6000    0.00010  -0.00002615    0.00007     0.000128  0.00008  0.07859  0.07859  6.41112  0  1338
1312  8  2 65  3.6667   0.06     0.6666    0.00003  -0.00002022    0.00001     0.000044  0.00003  0.07862  0.07862  6.41115  0  1339
1312  8  2 65  4.6667   0.03     1.0000    0.00001  -0.00001386   -0.00001     0.000002  0.00000  0.07862  0.07862  6.41115  0  1340
1312  8  2 65  6.0000   0.00     1.3334    0.00000  -0.00000581   -0.00001     0.000000  0.00000  0.07862  0.07862  6.41115  0  1341
1312  8  2 65 24.0000   0.00    18.0000    0.00000   0.00000000    0.00000     0.000000  0.00000  0.07862  0.07862  6.41115  0  1342
1312  8  2 65                                                                  0.003276           0.07862           6.41115  7  1343
1312  8 25 65 20.6000   0.00   548.6000    0.00000   0.00201495    0.00201     0.001007  0.55270  0.55270  0.63132  6.96385  0  1344
1312  8 25 65 20.6333   0.26     0.0333    0.00176   0.00466540    0.00642     0.004218  0.00014  0.55284  0.63146  6.96399  0  1345
1312  8 25 65 20.6667   0.50     0.0333    0.01026   0.00408943    0.01435     0.010385  0.00035  0.55319  0.63181  6.96434  0  1346
1312  8 25 65 20.7000   0.60     0.0333    0.01679   0.00197212    0.01876     0.016553  0.00055  0.55374  0.63236  6.96489  0  1347
1312  8 25 65 20.7667   0.70     0.0667    0.02545   0.00114136    0.02659     0.022674  0.00151  0.55525  0.63387  6.96640  0  1348
1312  8 25 65 20.8000   0.73     0.0333    0.02850   0.00051143    0.02901     0.027803  0.00093  0.55618  0.63480  6.96733  0  1349
1312  8 25 65 20.8667   0.74     0.0667    0.02957  -0.00007362    0.02950     0.029255  0.00195  0.55813  0.63675  6.96928  0  1350
1312  8 25 65 20.9000   0.73     0.0333    0.02850  -0.00068158    0.02782     0.028658  0.00096  0.55908  0.63770  6.97023  0  1351
1312  8 25 65 21.0000   0.62     0.1000    0.01834  -0.00085801    0.01748     0.022651  0.00227  0.56135  0.63997  6.97250  0  1352
1312  8 25 65 21.1333   0.51     0.1333    0.01082  -0.00057658    0.01025     0.013864  0.00185  0.56320  0.64182  6.97435  0  1353
1312  8 25 65 21.3333   0.39     0.2000    0.00525  -0.00037759    0.00487     0.007557  0.00151  0.56471  0.64333  6.97586  0  1354
1312  8 25 65 21.5333   0.30     0.2000    0.00258  -0.00023222    0.00235     0.003609  0.00072  0.56543  0.64405  6.97658  0  1355
1312  8 25 65 21.8000   0.23     0.2667    0.00126  -0.00012441    0.00114     0.001744  0.00046  0.56590  0.64452  6.97705  0  1356
1312  8 25 65 22.2000   0.17     0.4000    0.00056  -0.00006843    0.00049     0.000813  0.00032  0.56622  0.64484  6.97737  0  1357
1312  8 25 65 22.6667   0.13     0.4667    0.00027  -0.00004544    0.00022     0.000357  0.00017  0.56639  0.64501  6.97754  0  1358
1312  8 25 65 23.0667   0.10     0.4000    0.00013  -0.00003266    0.00010     0.000163  0.00007  0.56645  0.64507  6.97760  0  1359
1312  8 25 65 23.5333   0.08     0.4667    0.00007  -0.00001757    0.00006     0.000078  0.00004  0.56649  0.64511  6.97764  0  1360
1312  8 25 65 24.0000   0.07     0.4667    0.00005  -0.00001396    0.00004     0.000046  0.00002  0.56651  0.64513  6.97766  0  1361
1312  8 25 65                                                                  0.023605           0.56651           6.97766  7  1362
1312  8 26 65  1.0000   0.04     1.0000    0.00001  -0.00001116    0.00000     0.000018  0.00002  0.00002  0.64515  6.97768  0  1363
1312  8 26 65  2.6667   0.02     1.6666    0.00000  -0.00000707   -0.00001     0.000000  0.00000  0.00002  0.64515  6.97768  0  1364
1312  8 26 65  4.0000   0.00     1.3334    0.00000  -0.00000387   -0.00000     0.000000  0.00000  0.00002  0.64515  6.97768  0  1365
1312  8 26 65 24.0000   0.00    20.0000    0.00000   0.00000000    0.00000     0.000000  0.00000  0.00002  0.64515  6.97768  0  1366
1312  8 26 65                                                                  0.000001           0.00002           6.97768  7  1367
            .                                                                                                                .
            .                                                                                                                .
            .                                                                                                                .
            .                                                                                                                .
            .                                                                                                                .
1312  9 24 65 14.0667   0.00   254.0667    0.00000   0.00092998    0.00093     0.000465  0.11814  0.11814  0.25263  7.23031  0  1454
1312  9 24 65 14.1000   0.12     0.0333    0.00022   0.00219126    0.00241     0.001669  0.00006  0.11819  0.25269  7.23037  0  1455
1312  9 24 65 14.1333   0.26     0.0333    0.00176   0.00261262    0.00437     0.003388  0.00011  0.11831  0.25280  7.23048  0  1456
1312  9 24 65 14.1667   0.40     0.0333    0.00562   0.00283504    0.00845     0.006410  0.00021  0.11852  0.25302  7.23069  0  1457
1312  9 24 65 14.2000   0.52     0.0333    0.01141   0.00269554    0.01410     0.011276  0.00038  0.11890  0.25339  7.23107  0  1458
1312  9 24 65 14.2333   0.62     0.0333    0.01834   0.00240576    0.02074     0.017423  0.00058  0.11948  0.25397  7.23165  0  1459
1312  9 24 65 14.2667   0.70     0.0334    0.02545   0.00199644    0.02745     0.024095  0.00080  0.12028  0.25478  7.23245  0  1460
1312  9 24 65 14.3000   0.76     0.0333    0.03178   0.00183020    0.03361     0.030527  0.00102  0.12130  0.25579  7.23347  0  1461
1312  9 24 65 14.3333   0.82     0.0333    0.03954   0.00185159    0.04139     0.037499  0.00125  0.12255  0.25704  7.23472  0  1462
1312  9 24 65 14.3667   0.87     0.0333    0.04715   0.00127051    0.04842     0.044904  0.00150  0.12404  0.25854  7.23622  0  1463
1312  9 24 65 14.4000   0.89     0.0333    0.05019   0.00037354    0.05056     0.049490  0.00165  0.12569  0.26019  7.23787  0  1464
1312  9 24 65 14.4500   0.89     0.0500    0.05019  -0.00037327    0.04982     0.050189  0.00251  0.12820  0.26270  7.24038  0  1465
1312  9 24 65 14.5333   0.84     0.0834    0.04258  -0.00069413    0.04189     0.045852  0.00382  0.13203  0.26652  7.24420  0  1466
1312  9 24 65 14.6000   0.80     0.0667    0.03650  -0.00076093    0.03574     0.038812  0.00259  0.13461  0.26911  7.24678  0  1467
1312  9 24 65 14.7000   0.72     0.1000    0.02746  -0.00080073    0.02666     0.031198  0.00312  0.13773  0.27223  7.24990  0  1468
1312  9 24 65 14.8167   0.62     0.1167    0.01834  -0.00062510    0.01771     0.022187  0.00259  0.14032  0.27482  7.25249  0  1469
1312  9 24 65 15.0000   0.52     0.1833    0.01141  -0.00041874    0.01099     0.014350  0.00263  0.14295  0.27745  7.25512  0  1470
1312  9 24 65 15.1667   0.44     0.1666    0.00727  -0.00031138    0.00695     0.008970  0.00149  0.14445  0.27894  7.25662  0  1471
1312  9 24 65 15.4000   0.36     0.2333    0.00423  -0.00019784    0.00403     0.005491  0.00128  0.14573  0.28022  7.25790  0  1472
1312  9 24 65 15.6667   0.30     0.2667    0.00258  -0.00012222    0.00246     0.003245  0.00087  0.14659  0.28109  7.25877  0  1473
1312  9 24 65 16.0000   0.2[illegible]     0.3334    0.00158  -0.00008192    0.00150     0.001979  0.00066  0.14725  0.28175  7.25942  0  1474
1312  9 24 65 16.6000   0.18     0.6000    0.00065  -0.00005002    0.00060     0.001049  0.00063  0.14788  0.28238  7.26005  0  1475
1312  9 24 65 17.3333   0.14     0.7333    0.00033  -0.00002406    0.00031     0.000453  0.00033  0.14821  0.28271  7.26039  0  1476
1312  9 24 65 18.0000   0.12     0.6667    0.00022  -0.00001311    0.00020     0.000255  0.00017  0.14838  0.28288  7.26056  0  1477
1312  9 24 65 19.2000   0.10     1.2000    0.00013  -0.00000858    0.00012     0.000164  0.00020  0.14858  0.28308  7.26075  0  1478
1312  9 24 65 20.6000   0.08     1.4000    0.00007  -0.00000732    0.00007     0.000095  0.00013  0.14871  0.28321  7.26089  0  1479
1312  9 24 65 22.2000   0.06     1.6000    0.00003  -0.00000487    0.00003     0.000047  0.00008  0.14879  0.28329  7.26096  0  1480
1312  9 24 65 24.0000   0.05     1.8000    0.00002  -0.00000416    0.00002     0.000022  0.00004  0.14883  0.28333  7.26100  0  1481
1312  9 24 65                                                                  0.006201           0.14883           7.26100  7  1482
1312  9 25 65  2.0000   0.03     2.0000    0.00001  -0.00000429    0.00000     0.000009  0.00002  0.00002  0.28334  7.26102  0  1483
1312  9 25 65  3.6000   0.02     1.6000    0.00000  -0.00000356   -0.00000     0.000000  0.00000  0.00002  0.28334  7.26102  0  1484
1312  9 25 65  6.3333   0.00     2.7333    0.00000  -0.00000189   -0.00000     0.000000  0.00000  0.00002  0.28334  7.26102  0  1485
1312  9 25 65 24.0000   0.00    17.6667    0.00000   0.00000000    0.00000     0.000000  0.00000  0.00002  0.28334  7.26102  0  1486
1312  9 25 65                                                                  0.000001           0.00002           7.26102  7  1487

                                                                                 FLOW DURATION AS PERCENT OF TIME RUNOFF OCCURRED
1312  9    65                                                                 85.00      28.89     20.91     13.01     11.03      8  1488
1312  9    65                                                                  7.81       5.12      4.15      4.15      3.35      8  1489
1312  9    65                                                                  3.35       2.65      2.21      1.63      1.54      8  1490
1312  9    65                                                                  1.15       1.15      0.79      0.53      0.13      8  1491
1312  9    65                                                                  0.00       0.00      0.00      0.00      0.00      8  1492

                                                                                 FLOW DURATION AS PERCENT OF TOTAL TIME
1312  9    65                                                                  4.46       1.52      1.10      0.68      0.58      8  1493
1312  9    65                                                                  0.41       0.27      0.22      0.22      0.18      8  1494
1312  9    65                                                                  0.18       0.14      0.12      0.09      0.08      8  1495
1312  9    65                                                                  0.06       0.06      0.04      0.03      0.01      8  1496
1312  9    65                                                                  0.00       0.00      0.00      0.00      0.00      8  1497
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TABLE B5. -- CONTINUED

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                                                          FLOW DURATION AS PERCENT OF TOTAL RUNOFF
 1312  9    65                                         99.86      97.18     95.73     92.46     91.04       8  1498
 1312  9    65                                         87.99      84.69     82.61     82.61     79.76       8  1499
 1312  9    65                                         79.76      75.41     71.07     62.32     60.63       8  1500
 1312  9    65                                         50.76      50.76     38.73     27.57      7.30       8  1501
 1312  9    65                                          0.00       0.00      0.00      0.00      0.00       8  1502

                                                          ACC RUNOFF ABOVE GIVEN RATES
 1312  9    65                                         0.03434   0.03341   0.03291   0.03179   0.03130    8  1503
 1312  9    65                                         0.03025   0.02911   0.02840   0.02840   0.02742    8  1504
 1312  9    65                                         0.02742   0.02593   0.02443   0.02142   0.02084    8  1505
 1312  9    65                                         0.01745   0.01745   0.01331   0.00948   0.00251    8  1506
 1312  9    65                                         0.00000   0.00000   0.00000   0.00000   0.00000    8  1507

                                                          ACC TIME OF RUNOFF ABOVE GIVEN RATES
 1312  9    65                                        32.117    10.917     7.900     4.917     4.167      8  1508
 1312  9    65                                         2.950     1.933     1.567     1.567     1.267      8  1509
 1312  9    65                                         1.267     1.000     0.833     0.617     0.583      8  1510
 1312  9    65                                         0.433     0.433     0.300     0.200     0.050      8  1511
 1312  9    65                                         0.000     0.000     0.000     0.000     0.000      8  1512

                                                         FLOW DURATION AS PERCENT OF TIME RUNOFF OCCURRED
 1312       65                                        97.83     81.37     68.02     47.68     40.95       9  1572
 1312       65                                        33.84     22.93     18.89     13.15      6.75       9  1573
 1312       65                                         5.34      3.50      2.66      1.77      1.27       9  1574
 1312       65                                         1.07      0.88      0.63      0.58      0.42       9  1575
 1312       65                                         0.28      0.19      0.01      0.00      0.00       9  1576

                                                         FLOW DURATION AS PERCENT OF TOTAL TIME
 1312       65                                        34.88     29.01     24.25     17.00     14.60       9  1577
 1312       65                                        12.07      8.18      6.74      4.69      2.41       9  1578
 1312       65                                         1.90      1.25      0.95      0.63      0.45       9  1579
 1312       65                                         0.38      0.31      0.22      0.21      0.15       9  1580
 1312       65                                         0.10      0.07      0.00      0.00      0.00       9  1581

                                                         FLOW DURATION AS PERCENT OF TOTAL RUNOFF
 1312       65                                        99.99     99.70     98.67     95.08     92.94       9  1582
 1312       65                                        89.73     82.40     78.79     71.65     60.37       9  1583
 1312       65                                        57.12     51.30     47.48     41.67     37.25       9  1584
 1312       65                                        34.89     32.28     28.05     27.12     23.23       9  1585
 1312       65                                        18.65     14.92      1.20      0.00      0.00       9  1586

                                                         ACC RUNOFF ABOVE GIVEN RATES
 1312       65                                        6.01365   5.99599   5.93428   5.71838   5.58941   9  1587
 1312       65                                        5.39621   4.95572   4.73821   4.30881   3.63084   9  1588
 1312       65                                        3.43523   3.08538   2.85523   2.50584   2.24004   9  1589
 1312       65                                        2.09832   1.94121   1.68688   1.63078   1.39682   9  1590
 1312       65                                        1.12140   0.89722   0.07210   0.00000   0.00000   9  1591

                                                         ACC TIME OF RUNOFF ABOVE GIVEN RATES
 1312       65                                      3055.750  2541.517 2124.733 1489.400 1279.017      9  1592
 1312       65                                      1056.967   716.150  590.050  410.850  210.800      9  1593
 1312       65                                       166.783   109.467   83.050   55.350   39.750      9  1594
 1312       65                                        33.300    27.567   19.633   18.167   13.017      9  1595
 1312       65                                         8.600     6.000    0.267    0.000    0.000      9  1596

 MAXIMUM VOLUME FOR SELECTED TIME INTERVALS
 1312  2  7 65 17.6000     0.25300      1.                                                             6  1597
 1312  2  7 65 18.4000     0.44413      2.                                                             6  1598
 1312  2  7 65 19.2000     0.68898      6.                                                             6  1599
 1312  2  7 65 23.1333     1.23305     12.                                                             6  1600
 1312  2  8 65  8.6667     1.45340     24.                                                             6  1601
 1312  2  9 65  9.3333     1.60747     48.                                                             6  1602
 1312  2 15 65  9.0000     1.94100    192.                                                             6  1603

 PEAK DISCHARGE FOR YEAR
 1312  2  7 65 17.3333     0.27039                                                                     6  1604
  999       65 WATERSHED IDENTIFICATION FOR UPDATING STORAGE TAPE = Q12                                2  1605
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3. Daily summaries.
4. Monthly flow-duration summaries.
5. Yearly flow-duration summaries.
6. Maximum volumes for selected time intervals.
7. Maximum peak discharge for the period of record being processed.
8. End station code.

Each different output summary has a unique (KODE) except the error output as described on page 27. The information contained in each output with the format for S.SU06 listed first, followed by the format for S.SU00, is illustrated below. Note that the information contained in each format illustration is identified by, reading from top to bottom, (1) print position or card column whichever is applicable, (2) data format specification, and (3) the Fortran variable name.

TABLE B6. -- 1965 RUNOFF OUTPUT IN ABBREVIATED FORM FOR PONY MOUNTAIN BRANCH WATERSHED, CULPEPER, VIRGINIA. FORMAT FOR PERMANENT STORAGE (S.SUOO)

(1-5)*	(6-8)	(9-11)	(12-14)	(15-22)	(23-28)	(29-38)	(39-48)	(49-59)	(60-69)	(70-79)	(80-89)	(90-99)	(100-109)	(110-119)	(120)	(121-122)	(124-126)	(127-131)
1312	1	1	65	0.0000	0.11	0.0000	0.00017	0.00000000	0.00017	0.00017	0.00000	0.00000	0.00000	0.00000	0		Q12	1
1312	1	1	65	1.3333	0.11	1.3333	0.00017	-0.00000022	0.00017	0.00017	0.00023	0.00023	0.00023	0.00023	0		Q12	2
1312	1	1	65	14.0000	0.10	12.6667	0.00013	0.00000144	0.00013	0.00015	0.00194	0.00217	0.00217	0.00217	0		Q12	3
1312	1	1	65	15.6667	0.11	1.6667	0.00017	0.00000446	0.00018	0.00016	0.00026	0.00243	0.00243	0.00243	0		Q12	4
1312	1	1	65	16.6667	0.12	1.0000	0.00022	0.00000281	0.00022	0.00020	0.00020	0.00263	0.00263	0.00263	0		Q12	5
1312	1	1	65	20.6667	0.12	4.0000	0.00022	0.00000281	0.00022	0.00022	0.00088	0.00351	0.00351	0.00351	0		Q12	6
1312	1	1	65	21.6667	0.13	1.0000	0.00027	0.00000813	0.00028	0.00025	0.00025	0.00376	0.00376	0.00376	0		Q12	7
1312	1	1	65	22.2000	0.14	0.5333	0.00033	0.00001144	0.00034	0.00031	0.00017	0.00392	0.00392	0.00392	0		Q12	8
1312	1	1	65	22.6667	0.15	0.4667	0.00040	0.00001473	0.00041	0.00038	0.00018	0.00410	0.00410	0.00410	0		Q12	9
1312	1	1	65	23.0000	0.16	0.3333	0.00047	0.00000865	0.00048	0.00045	0.00015	0.00425	0.00425	0.00425	0		Q12	10
1312	1	1	65	23.5333	0.16	0.5333	0.00047	0.00000618	0.00048	0.00048	0.00026	0.00450	0.00450	0.00450	0		Q12	11
1312	1	1	65	24.0000	0.17	0.4667	0.00056	0.00000622	0.00056	0.00052	0.00024	0.00475	0.00475	0.00475	0		Q12	12
1312	1	1	65							0.00020		0.00475		0.00475	7		Q12	13
1312	1	2	65	0.6667	0.17	0.6667	0.00056	-0.00000311	0.00055	0.00056	0.00037	0.00037	0.00512	0.00512	0		Q12	14
1312	1	2	65	1.6000	0.16	0.9333	0.00047	-0.00000309	0.00047	0.00051	0.00048	0.00085	0.00560	0.00560	0		Q12	15
1312	1	2	65	2.1333	0.16	0.5333	0.00047	0.00000541	0.00048	0.00047	0.00025	0.00110	0.00585	0.00585	0		Q12	16
1312	1	2	65	2.6667	0.17	0.5333	0.00056	0.00001415	0.00057	0.00053	0.00028	0.00138	0.00613	0.00613	0		Q12	17
1312	1	2	65	3.3333	0.19	0.6667	0.00075	0.00001433	0.00077	0.00067	0.00045	0.00183	0.00658	0.00658	0		Q12	18
1312	1	2	65	3.8667	0.20	0.5333	0.00086	0.00000555	0.00087	0.00082	0.00044	0.00227	0.00701	0.00701	0		Q12	19
1312	1	2	65	4.3333	0.20	0.4667	0.00086	-0.00000222	0.00086	0.00087	0.00040	0.00267	0.00742	0.00742	0		Q12	20
1312	1	2	65	7.0000	0.18	2.6667	0.00065	-0.00000438	0.00065	0.00075	0.00201	0.00468	0.00943	0.00943	0		Q12	21
1312	1	2	65	8.3333	0.17	1.3333	0.00056	-0.00000218	0.00056	0.00060	0.00080	0.00548	0.01023	0.01023	0		Q12	22
1312	1	2	65	9.1667	0.17	0.8333	0.00056	0.00000390	0.00056	0.00056	0.00047	0.00595	0.01069	0.01069	0		Q12	23
1312	1	2	65	11.4000	0.20	2.2333	0.00086	0.00000398	0.00087	0.00071	0.00160	0.00754	0.01229	0.01229	0		Q12	24
1312	1	2	65	14.0000	0.20	2.6000	0.00086	-0.00000197	0.00086	0.00087	0.00225	0.00979	0.01454	0.01454	0		Q12	25
1312	1	2	65	17.0000	0.18	3.0000	0.00065	-0.00000298	0.00065	0.00075	0.00226	0.01206	0.01681	0.01681	0		Q12	26
1312	1	2	65	22.6667	0.16	5.6667	0.00047	-0.00000318	0.00047	0.00056	0.00317	0.01522	0.01997	0.01997	0		Q12	27
1312	1	2	65	24.0000	0.15	1.3333	0.00040	-0.00000215	0.00040	0.00043	0.00058	0.01580	0.02055	0.02055	0		Q12	28
1312	1	2	65							0.00066		0.01580		0.02055	7		Q12	29
1312	1	3	65	2.0000	0.15	2.0000	0.00040	-0.00000096	0.00040	0.00040	0.00079	0.00079	0.02134	0.02134	0		Q12	30
1312	1	3	65	5.0000	0.14	3.0000	0.00033	-0.00000190	0.00033	0.00036	0.00109	0.00188	0.02243	0.02243	0		Q12	31
1312	1	3	65	11.0000	0.12	6.0000	0.00022	-0.00000143	0.00022	0.00027	0.00163	0.00351	0.02406	0.02406	0		Q12	32
1312	1	3	65	16.6667	0.11	5.6667	0.00017	-0.00000049	0.00017	0.00019	0.00110	0.00461	0.02516	0.02516	0		Q12	33
1312	1	3	65	20.3333	0.11	3.6667	0.00017	-0.00000076	0.00017	0.00017	0.00063	0.00524	0.02579	0.02579	0		Q12	34
1312	1	3	65	24.0000	0.10	3.6667	0.00013	-0.00000076	0.00013	0.00015	0.00056	0.00580	0.02634	0.02634	0		Q12	35
1312	1	3	65							0.00024		0.00580		0.07634	7		Q12	36
1312	1	4	65	5.6667	0.10	5.6667	0.00013	-0.00000055	0.00013	0.00013	0.00075	0.00075	0.02709	0.02709	0		Q12	37
1312	1	4	65	10.6667	0.09	5.0000	0.00010	0.00000358	0.00010	0.00012	0.00059	0.00134	0.02768	0.02768	0		Q12	38
1312	1	4	65	12.0000	0.11	1.3333	0.00017	0.00000418	0.00018	0.00014	0.00019	0.00153	0.02787	0.02787	0		Q12	39
1312	1	4	65	18.0000	0.11	6.0000	0.00017	-0.00000046	0.00017	0.00017	0.00104	0.00257	0.02691	0.02891	0		Q12	40
1312	1	4	65	24.0000	0.10	6.0000	0.00013	-0.00000115	0.00013	0.00015	0.00091	0.00348	0.02982	0.02982	0		Q12	41
1312	1	4	65							0.00015		0.00348		0.02982	7		Q12	42
1312	1	5	65	4.0000	0.09	4.0000	0.00010	-0.00000124	0.00010	0.00012	0.00046	0.00046	0.03029	0.03029	0		Q12	43
1312	1	5	65	9.0000	0.08	5.0000	0.00007	0.00000219	0.00008	0.00009	0.00043	0.00090	0.03072	0.03072	0		Q12	44
1312	1	5	65	13.0000	0.12	4.0000	0.00022	0.00000281	0.00022	0.00015	0.00059	0.00149	0.03131	0.03131	0		Q12	45
1312	1	5	65	14.6667	0.12	1.6667	0.00022	-0.00000077	0.00022	0.00022	0.00036	0.00185	0.03168	0.03168	0		Q12	46
1312	1	5	65	18.3333	0.11	3.6667	0.00017	-0.00000169	0.00017	0.00019	0.00071	0.00256	0.03239	0.03239	0		Q12	47
1312	1	5	65	21.3333	0.10	3.0000	0.00013	-0.00000196	0.00013	0.00015	0.00045	0.00301	0.03284	0.03284	0		Q12	48
1312	1	5	65	24.0000	0.09	2.6667	0.00010	-0.00000138	0.00010	0.00011	0.00031	0.00332	0.03314	0.03314	0		Q12	49
1312	1	5	65							0.00014		0.00332		0.03314	7		Q12	50
1312	1	6	65	8.0000	0.08	8.0000	0.00007	-0.00000034	0.00007	0.00009	0.00068	0.00068	0.03383	0.03383	0		Q12	51
1312	1	6	65	9.3333	0.08	1.3333	0.00007	0.00000164	0.00007	0.00007	0.00010	0.00078	0.03393	0.03393	0		Q12	52
			⋮												⋮			
1312	8	2	65	2.4000	0.12	0.1333	0.00022	-0.00003511	0.00018	0.00022	0.00003	0.07851	0.07851	6.41104	0		Q12	1337
1312	8	2	65	3.0000	0.09	0.6000	0.00010	-0.00002615	0.00007	0.00013	0.00008	0.07859	0.07859	6.41112	0		Q12	1338
1312	8	2	65	3.6667	0.06	0.6666	0.00003	-0.00002022	0.00001	0.00004	0.00003	0.07862	0.07862	6.41115	0		Q12	1339
1312	8	2	65	4.6667	0.03	1.0000	0.00001	-0.00001386	-0.00001	0.00000	0.00000	0.07862	0.07862	6.41115	0		Q12	1340
1312	8	2	65	6.0000	0.00	1.3334	0.00000	-0.00000581	-0.00001	0.00000	0.00000	0.07862	0.07862	6.41115	0		Q12	1341
1312	8	2	65	24.0000	0.00	18.0000	0.00000	0.00000000	0.00000	0.00000	0.00000	0.07862	0.07862	6.41115	0		Q12	1342
1312	8	2	65							0.00328		0.07862		6.41115	7		Q12	1343
1312	8	25	65	20.6000	0.00	548.6000	0.00000	0.00201495	0.00201	0.00101	0.55270	0.55270	0.63132	6.96385	0		Q12	1344
1312	8	25	65	20.6333	0.26	0.0333	0.00176	0.00466540	0.00642	0.00422	0.00014	0.55284	0.63146	6.96399	0		Q12	1345
1312	8	25	65	20.6667	0.50	0.0333	0.01026	0.00408943	0.01435	0.01038	0.00035	0.55319	0.63181	6.96434	0		Q12	1346
1312	8	25	65	20.7000	0.60	0.0333	0.01679	0.00197212	0.01876	0.01655	0.00055	0.55374	0.63236	6.96489	0		Q12	1347
1312	8	25	65	20.7667	0.70	0.0667	0.02545	0.00114136	0.02659	0.02267	0.00151	0.55525	0.63387	6.96640	0		Q12	1348
1312	8	25	65	20.8000	0.73	0.0333	0.02850	0.00051143	0.02901	0.02780	0.00093	0.55618	0.63480	6.96733	0		Q12	1349
1312	8	25	65	20.8667	0.74	0.0667	0.02957	-0.00007362	0.02950	0.02925	0.00195	0.55813	0.63675	6.96928	0		Q12	1350
1312	8	25	65	20.9000	0.73	0.0333	0.02850	-0.00068158	0.02782	0.02866	0.00096	0.55908	0.63770	6.97023	0		Q12	1351
1312	8	25	65	21.0000	0.62	0.1000	0.01834	-0.00085801	0.01748	0.02265	0.00227	0.56135	0.63997	6.97250	0		Q12	1352
1312	8	25	65	21.1333	0.51	0.1333	0.01082	-0.00057658	0.01025	0.01386	0.00185	0.56320	0.64182	6.97435	0		Q12	1353
1312	8	25	65	21.3333	0.39	0.2000	0.00525	-0.00037759	0.00487	0.00756	0.00151	0.56471	0.64333	6.97586	0		Q12	1354
1312	8	25	65	21.5333	0.30	0.2000	0.00258	-0.00023222	0.00235	0.00361	0.00072	0.56543	0.64405	6.97658	0		Q12	1355
1312	8	25	65	21.8000	0.23	0.2667	0.00126	-0.00012441	0.00114	0.00174	0.00046	0.56590	0.64452	6.97705	0		Q12	1356
1312	8	25	65	22.2000	0.17	0.4000	0.00056	-0.00006843	0.00049	0.00081	0.00032	0.56622	0.64484	6.97737	0		Q12	1357
1312	8	25	65	22.6667	0.13	0.4667	0.00027	-0.00004544	0.00022	0.00036	0.00017	0.56639	0.64501	6.97754	0		Q12	1358
1312	8	25	65	23.0667	0.10	0.4000	0.00013	-0.00003266	0.00010	0.00016	0.00007	0.56645	0.64507	6.97760	0		Q12	1359
1312	8	25	65	23.5333	0.08	0.4667	0.00007	-0.00001757	0.00006	0.00008	0.00004	0.56649	0.64511	6.97764	0		Q12	1360
1312	8	25	65	24.0000	0.07	0.4667	0.00005	-0.00001396	0.00004	0.00005	0.00002	0.56651	0.64513	6.97766	0		Q12	1361
1312	8	25	65							0.02360		0.56651		6.97766	7		Q12	1362
1312	8	26	65	1.0000	0.04	1.0000	0.00001	-0.00001116	0.00000	0.00002	0.00002	0.00002	0.64515	6.97768	0		Q12	1363
1312	8	26	65	2.6667	0.02	1.6666	0.00000	-0.00000707	-0.00001	0.00000	0.00000	0.00002	0.64515	6.97768	0		Q12	1364
1312	8	26	65	4.0000	0.00	1.3334	0.00000	-0.00000387	-0.00000	0.00000	0.00000	0.00002	0.64515	6.97768	0		Q12	1365
1312	8	26	65	24.0000	0.00	20.0000	0.00000	0.00000000	0.00000	0.00000	0.00000	0.00002	0.64515	6.97768	0		Q12	1366
1312	8	26	65							0.00000		0.00002		6.97768	7		Q12	1367
			⋮												⋮			
1312	9	24	65	14.0667	0.00	254.0667	0.00000	0.00092998	0.00093	0.00046	0.11814	0.11814	0.25263	7.23031	0		Q12	1454
1312	9	24	65	14.1000	0.12	0.0333	0.00022	0.00219126	0.00241	0.00167	0.00006	0.11819	0.25269	7.23037	0		Q12	1455
1312	9	24	65	14.1333	0.26	0.0333	0.00176	0.00261262	0.00437	0.00339	0.00011	0.11831	0.25280	7.23048	0		Q12	1456
1312	9	24	65	14.1667	0.40	0.0333	0.00562	0.00283504	0.00845	0.00641	0.00021	0.11852	0.25302	7.23069	0		Q12	1457
1312	9	24	65	14.2000	0.52	0.0333	0.01141	0.00269554	0.01410	0.01128	0.00038	0.11890	0.25339	7.23107	0		Q12	1458
1312	9	24	65	14.2333	0.62	0.0333	0.01834	0.00240576	0.02074	0.01742	0.00058	0.11948	0.25397	7.23165	0		Q12	1459
1312	9	24	65	14.2667	0.70	0.0334	0.02545	0.00199644	0.02745	0.02410	0.00080	0.12028	0.25478	7.23245	0		Q12	1460
1312	9	24	65	14.3000	0.76	0.0333	0.03178	0.00183020	0.03361	0.03053	0.00102	0.12130	0.25579	7.23347	0		Q12	1461
1312	9	24	65	14.3333	0.82	0.0333	0.03954	0.00185159	0.04139	0.03750	0.00125	0.12255	0.25704	7.23472	0		Q12	1462
1312	9	24	65	14.3667	0.87	0.0333	0.04715	0.00127051	0.04842	0.04490	0.00150	0.12404	0.25854	7.23622	0		Q12	1463
1312	9	24	65	14.4000	0.89	0.0333	0.05019	0.00037354	0.05056	0.04949	0.00165	0.12569	0.26019	7.23787	0		Q12	1464
1312	9	24	65	14.4500	0.89	0.0500	0.05019	-0.00037327	0.04982	0.05019	0.00251	0.12820	0.26270	7.24038	0		Q12	1465
1312	9	24	65	14.5333	0.84	0.0834	0.04258	-0.00069413	0.04189	0.04585	0.00382	0.13203	0.26652	7.24420	0		Q12	1466
1312	9	24	65	14.6000	0.80	0.0667	0.03650	-0.00076093	0.03574	0.03881	0.00259	0.13461	0.26911	7.24678	0		Q12	1467
1312	9	24	65	14.7000	0.72	0.1000	0.02746	-0.00080073	0.02666	0.03120	0.00312	0.13773	0.27223	7.24990	0		Q12	1468
1312	9	24	65	14.8167	0.62	0.1167	0.01834	-0.00062510	0.01771	0.02219	0.00259	0.14032	0.27482	7.25249	0		Q12	1469

* The numbers in parentheses refer to the print position of the respective data fields. See section - Utility Unit S.SUOO Output Format - for an explanation of the data contained in each column.

TABLE B6. -- CONTINUED

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(1-4)* (6-8) (9-11) (12-14) (15-22) (23-28) (29-38) (39-48) (49-59) (60-69) (70-79) (80-89) (90-99) (100-109) (110-119) (120) (121-122) (124-126) (127-131)
1312  9 24 65  15.0000     0.52    0.1833   0.01141-0.00041874   0.01099   0.01435   0.00263   0.14295   0.27745   7.25512 0 012 1470
1312  9 24 65  15.1667     0.44    0.1666   0.00727-0.00031138   0.00695   0.00897   0.00149   0.14445   0.27894   7.25662 0 012 1471
1312  9 24 65  15.4000     0.36    0.2333   0.00423-0.00019784   0.00403   0.00549   0.00128   0.14573   0.28022   7.25790 0 012 1472
1312  9 24 65  15.6667     0.30    0.2667   0.00258-0.00012222   0.00246   0.00324   0.00087   0.14659   0.28109   7.25877 0 012 1473
1312  9 24 65  16.0000     0.25    0.3334   0.00158-0.00008192   0.00150   0.00198   0.00066   0.14725   0.28175   7.25942 0 012 1474
1312  9 24 65  16.6000     0.18    0.6000   0.00065-0.00005002   0.00060   0.00105   0.00063   0.14788   0.28238   7.26005 0 012 1475
1312  9 24 65  17.3333     0.14    0.7333   0.00033-0.00002406   0.00031   0.00045   0.00033   0.14821   0.28271   7.26039 0 012 1476
1312  9 24 65  18.0000     0.12    0.6667   0.00022-0.00001311   0.00020   0.00026   0.00017   0.14838   0.28288   7.26056 0 012 1477
1312  9 24 65  19.2000     0.10    1.2000   0.00013-0.00000858   0.00012   0.00016   0.00020   0.14858   0.28308   7.26075 0 012 1478
1312  9 24 65  20.6000     0.08    1.4000   0.00007-0.00000732   0.00007   0.00009   0.00013   0.14871   0.28321   7.26089 0 012 1479
1312  9 24 65  22.2000     0.06    1.6000   0.00003-0.00000487   0.00003   0.00005   0.00008   0.14879   0.28329   7.26096 0 012 1480
1312  9 24 65  24.0000     0.05    1.8000   0.00002-0.00000416   0.00002   0.00002   0.00004   0.14883   0.28333   7.26100 0 012 1481
1312  9 24 65                                                              0.00620             0.14883             7.26100 7 012 1482
1312  9 25 65   2.0000     0.03    2.0000   0.00001-0.00000429   0.00000   0.00001   0.00002   0.00002   0.28334   7.26102 0 012 1483
1312  9 25 65   3.6000     0.02    1.6000   0.00000-0.00000356  -0.00000   0.00000   0.00000   0.00002   0.28334   7.26102 0 012 1484
1312  9 25 65   6.3333     0.00    2.7333   0.00000-0.00000189  -0.00000   0.00000   0.00000   0.00002   0.28334   7.26102 0 012 1485
1312  9 25 65  24.0000     0.00   17.6667   0.00000 0.00000000   0.00000   0.00000   0.00000   0.00002   0.28334   7.26102 0 012 1486
1312  9 25 65                                                              0.00000             0.00002             7.26102 7 012 1487
1312  9    65                                                              85.0023   28.8927   20.9088   13.0130   11.0280 8 012 1488
1312  9    65                                                               7.8075    5.1169    4.1464    4.1464    3.3524 8 012 1489
1312  9    65                                                               3.3524    2.6467    2.2057    1.6322    1.5440 8 012 1490
1312  9    65                                                               1.1468    1.1468    0.7940    0.5294    0.1323 8 012 1491
1312  9    65                                                               0.0000    0.0000    0.0000    0.0000    0.0000 8 012 1492
1312  9    65                                                               4.4607    1.5162    1.0972    0.6829    0.5787 8 012 1493
1312  9    65                                                               0.4097    0.2685    0.2176    0.2176    0.1759 8 012 1494
1312  9    65                                                               0.1759    0.1389    0.1157    0.0857    0.0810 8 012 1495
1312  9    65                                                               0.0602    0.0602    0.0417    0.0278    0.0069 8 012 1496
1312  9    65                                                               0.0000    0.0000    0.0000    0.0000    0.0000 8 012 1497
1312  9    65                                                              99.8775   97.1771   95.7287   92.4612   91.0444 8 012 1498
1312  9    65                                                              87.9927   84.6879   82.6071   82.6071   79.7620 8 012 1499
1312  9    65                                                              79.7620   75.4138   71.0661   62.3195   60.6306 8 012 1500
1312  9    65                                                              50.7592   50.7592   38.7274   27.5678    7.2977 8 012 1501
1312  9    65                                                               0.0000    0.0000    0.0000    0.0000    0.0000 8 012 1502
1312  9    65                                                               0.0343    0.0334    0.0329    0.0318    0.0313 8 012 1503
1312  9 .  65                                                               0.0303    0.0291    0.0284    0.0284    0.0274 8 012 1504
1312  9    65                                                               0.0274    0.0259    0.0244    0.0214    0.0208 8 012 1505
1312  9    65                                                               0.0175    0.0175    0.0133    0.0095    0.0025 8 012 1506
1312  9    65                                                               0.0000    0.0000    0.0000    0.0000    0.0000 8 012 1507
1312  9    65                                                              32.1167   10.9166    7.9000    4.9167    4.1667 8 012 1508
1312  9    65                                                               2.9500    1.9333    1.5667    1.5667    1.2667 8 012 1509
1312  9    65                                                               1.2667    1.0000    0.8334    0.6167    0.5834 8 012 1510
1312  9    65                                                               0.4333    0.4333    0.3000    0.2000    0.0500 8 012 1511
1312  9    65                                                               0.0000    0.0000    0.0000    0.0000    0.0000 8 012 1512
            .                                                                                                          .
            .                                                                                                          .
            .                                                                                                          .
            .                                                                                                          .
            .                                                                                                          .
            .                                                                                                          .
            .                                                                                                          .
1312 10    65                                                              83.4087   53.2430   45.7014   33.6350   33.6350 8 012 1547
1312 10    65                                                              33.6350   27.1493   27.1493   17.1945   13.8762 8 012 1548
1312 10    65                                                               7.8431    5.5807    2.3378    0.0000    0.0000 8 012 1549
1312 10    65                                                               0.0000    0.0000    0.0000    0.0000    0.0000 8 012 1550
1312 10    65                                                               0.0000    0.0000    0.0000    0.0000    0.0000 8 012 1551
1312 10    65                                                               2.4776    1.5815    1.3575    0.9991    0.9991 8 012 1552
1312 10    65                                                               0.9991    0.8065    0.8065    0.5108    0.4122 8 012 1553
1312 10    65                                                               0.2330    0.1658    0.0694    0.0000    0.0000 8 012 1554
1312 10    65                                                               0.0000    0.0000    0.0000    0.0000    0.0000 8 012 1555
1312 10    65                                                               0.0000    0.0000    0.0000    0.0000    0.0000 8 012 1556
1312 10    65                                                              99.9613   99.2452   98.6037   95.8922   95.8922 8 012 1557
1312 10    65                                                              95.8922   90.9683   90.9683   73.8755   66.2419 8 012 1558
1312 10    65                                                              48.0067   38.0475   18.9177    0.0000    0.0000 8 012 1559
1312 10    65                                                               0.0000    0.0000    0.0000    0.0000    0.0000 8 012 1560
1312 10    65                                                               0.0000    0.0000    0.0000    0.0000    0.0000 8 012 1561
1312 10    65                                                               0.0333    0.0331    0.0329    0.0320    0.0320 8 012 1562
1312 10    65                                                               0.0320    0.0303    0.0303    0.0246    0.0221 8 012 1563
1312 10    65                                                               0.0160    0.0127    0.0063    0.0000    0.0000 8 012 1564
1312 10    65                                                               0.0000    0.0000    0.0000    0.0000    0.0000 8 012 1565
1312 10    65                                                               0.0000    0.0000    0.0000    0.0000    0.0000 8 012 1566
1312 10    65                                                              18.4333   11.7667   10.1000    7.4333    7.4333 8 012 1567
1312 10    65                                                               7.4333    6.0000    6.0000    3.8000    3.0667 8 012 1568
1312 10    65                                                               1.7333    1.2333    0.5167    0.0000    0.0000 8 012 1569
1312 10    65                                                               0.0000    0.0000    0.0000    0.0000    0.0000 8 012 1570
1312 10    65                                                               0.0000    0.0000    0.0000    0.0000    0.0000 8 012 1571
1312       65                                                              97.8283   81.3654   68.0223   47.6824   40.9471 9 012 1572
1312       65                                                              33.8383   22.9272   18.8902   13.1532    6.7487 9 012 1573
1312       65                                                               5.3395    3.5045    2.6588    1.7720    1.2726 9 012 1574
1312       65                                                               1.0661    0.8825    0.6286    0.5816    0.4167 9 012 1575
1312       65                                                               0.2753    0.1921    0.0085    0.0000    0.0000 9 012 1576
1312       65                                                              34.8830   29.0127   24.2549   17.0023   14.6006 9 012 1577
1312       65                                                              12.0658    8.1752    6.7357    4.6901    2.4064 9 012 1578
1312       65                                                               1.9039    1.2496    0.9481    0.6319    0.4538 9 012 1579
1312       65                                                               0.3801    0.3147    0.2241    0.2074    0.1486 9 012 1580
1312       65                                                               0.0982    0.0685    0.0030    0.0000    0.0000 9 012 1581
1312       65                                                              99.9933   99.6996   98.6734   95.0836   92.9390 9 012 1582
1312       65                                                              89.7266   82.4023   78.7856   71.6456   60.3726 9 012 1583
1312       65                                                              57.1200   51.3028   47.4760   41.6664   37.2467 9 012 1584
1312       65                                                              34.8903   32.2779   28.0490   27.1162   23.2260 9 012 1585
1312       65                                                              18.6463   14.9187    1.1989    0.0000    0.0000 9 012 1586
1312       65                                                               6.0137    5.9960    5.9343    5.7184    5.5894 9 012 1587
1312       65                                                               5.3962    4.9557    4.7382    4.3088    3.6308 9 012 1588
1312       65                                                               3.4352    3.0854    2.8552    2.5058    2.2400 9 012 1589
1312       65                                                               2.0983    1.9412    1.6869    1.6308    1.3968 9 012 1590
1312       65                                                               1.1214    0.8972    0.0721    0.0000    0.0000 9 012 1591
1312       65                                                            3055.7501 2541.5168 2124.7335 1489.4001 1279.0168 9 012 1592
1312       65                                                            1056.9666  716.1500  590.0500  410.8500  210.8000 9 012 1593
1312       65                                                             166.7833  109.4667   83.0500   55.3501   39.7501 9 012 1594
1312       65                                                              33.2999   27.5666   19.6333   18.1667   13.0166 9 012 1595
1312       65                                                               8.6000    6.0000    0.2667    0.0000    0.0000 9 012 1596
1312  2  7 65  17.6000  0.25300        1.                                                                                  6 012 1597
1312  2  7 65  18.4000  0.44413        2.                                                                                  6 012 1598
1312  2  7 65  19.2000  0.88898        6.                                                                                  6 012 1599
1312  2  7 65  23.1333  1.23305       12.                                                                                  6 012 1600
1312  2  8 65   8.6667  1.45340       24.                                                                                  6 012 1601
1312  2  9 65   9.3333  1.60747       48.                                                                                  6 012 1602
1312  2 15 65   9.0000  1.94100      192.                                                                                  6 012 1603
1312  2  7 65  17.3333  0.27039                                                                                            6 012 1604
 999                                                                                                                       2 012 1605
```

* The numbers in parentheses refer to the print position of the respective data fields. See section - Utility Unit S.SUOO Output Format - for an explanation of the data contained in each column.

UTILITY UNIT S.SU06 Output Format (For listing and temporary storage)

Note that the numbers refer to print positions on the IBM 1401 which prints 10 characters per inch, with the extreme left position designated as No. 1.

KODE = 0 (line of basic data).--Note that the first list of symbols refers to output with pondage correction, whereas the second list refers to the output that will result when no pondage correction is required. The dash marks indicate that the symbol for both outputs is the same; blank spaces indicate no output.

2-6	7-9	10-12	13-15	16-23	24-30	31-40
+XXXX	+XX	+ XX	+XX	+XX.XXXX	+XX.XX	+XXXX.XXXX
IWID	MONTHO	NDAYO	NYEAR	HRO	HTO	TIO
----	MONTH	NDAY	------	HR	HT	TI

41-50	51-63	64-74	75-87	88-96
+XXX.XXXXX	±XXX.XXXXXXXX	+XXXX.XXXXX	+XXXX.XXXXXX	+XX.XXXXX
RATEO	PCORRO	AJRATE	RRATE	RUNTI
RATE			------	------

97-105	106-114	115-123	124	125-126	127-132
+XX.XXXXX	+XX.XXXXX	+XX.XXXXX	X	+X	+XXXXX
ACDR	ACMR	ACYRR	NEST	KODE	NUM
-----	-----	------	-----	-----	----

KODE = 2 (end of record).--

2-6	13-15	16-70	71-73	125-126	127-132
+XXXX	+XX	See note below	XXX	+X	+XXXXX
NRECD	NYEAR		KUPDAT	KODE	NUM

Note: Print positions 16-70 contain the following information: WATERSHED IDENTIFICATION FOR UPDATING STORAGE TAPE =.

KODE = 6 (maximum volume and peak discharge).--maximum volume.

2-6	7-9	10-12	13-15	16-23	24-35
+XXXX	+XX	+XX	+XX	+XX.XXXX	+XXXXX.XXXXX
IWID	MDATE(I)	NDATE(I)	NYEAR	TDAY(I)	AMAX(I)

36-45	124-126	127-132
+XXXXXXXX.	+XX	+XXXXX
HRS	KODE	NUM

Peak discharge.

2-6	7-9	10-12	13-15	16-23	24-35	125-126	127-132
+XXXX	+XX	+ XX	+ XX	+XX.XXXX	+XXXXX.XXXXX	+X	+XXXXX
IWID	MP	NP	NYEAR	TP	PEAK	KODE	NUM

KODE = 7 (daily summary).--

2-6	7-9	10-12	13-15	88-96	97-105	115-123	125-126
+XXXX	+XX	+XX	+XX	+XX.XXXXX	+XX.XXXXX	+XX.XXXXX	+X
IWID	MONTH	NDAY	NYEAR	AVGDR	ACDR	ACYRR	KODE

127-132
+XXXXX
NUM

KODE = 8 (monthly flow-duration summary).--Note that the top line refers to flow-duration output from J = 1-75; the second refers to output from J = 76-100; and the third line refers to output from J = 101-125 (see output section appendix list B2).

2-6	7-9	13-15	77-83	87-93	96-102	105-111
---	---	---	78-86	88-96	97-105	106-114
---	---	---	76-84	86-94	95-103	104-112
+XXXX	+XX	+ XX	+XXX.XX	+XXX.XX	+XXX.XX	+XXX.XX
----	---	---	+XX.XXXXX	+XX.XXXXX	+XX.XXXXX	+XX.XXXXX
----	---	---	+XXXX.XXX	+XXXX.XXX	+XXXX.XXX	+XXXX.XXX
IWID	MONTHO	NYEAR	PER(J)	PER(J +1)	PER(J+2)	PER(J+3)

114-120	125-126	127-132
115-123	-------	-------
113-121	-------	-------
+XXX.XX	+X	+XXXXX
+XX.XXXXX	--	-------
+XXXX.XXX	--	-------
PER(J+4)	KODE	NUM

KODE = 9 (yearly flow-duration summaries).--The output for KODE = 9 follows the exact format given for KODE = 8.

Error.--If a negative time interval is encountered during processing, the numbers of the data cards causing this error are written on S.SU06 only, then normal processing is continued with the next data card. The information contained in the error output is as follows:

1-5	6-8	9-11	12-14	15-22	23-28	29-38
+XXXX	+XX	+XX	+ XX	+ XX.XXXX	+ XX.XX	+XXXX.XXXX
IWID	MONTH	NDAY	NYEAR	HR	HT	TI

39-91	92-96	97-100	101-105
(See note below)	+XXXX	(See note below)	+XXXX
	KSEQO		KSEQ

Note: Print positions 39-91 contain: NEGATIVE OR ZERO TIME INTERVAL BETWEEN CARD NUMBERS. Print positions 97-100 contain: AND.

UTILITY UNIT S.SU00 Output Format (For permanent storage)

The data are placed on magnetic tape for permanent storage in a 131-column card image as indicated by the formats listed below. These same numbers refer to print positions if the data are listed by the IBM 1401.

KODE = 0 (line of basic data).--Note that the order of presentation for the KODE = 0 output is identical to that given for S.SU06.

1-5	6-8	9-11	12-14	15-22	23-28	29-38
+XXXX	+XX	+XX	+XX	+XX.XXXX	+XX.XX	+XXXX.XXXX
IWID	MONTHO	NDAYO	NYEAR	HRO	HTO	TIO
----	MONTH	NDAY	------	HR	HT	TI

39-48	49-59	60-69	70-79	80-89
+XXXX.XXXXX	±X.XXXXXXXX	+XXX.XXXXX	+XXX.XXXXX	+XXX.XXXXX
RATEO	PCORRO	AJRATE	RRATE	RUNTI
------	-------	RATE	------	------

90-99	100-109	110-119	120	121-122	124-126	127-131
+XXX.XXXXX	+XXX.XXXXX	+XXX.XXXXX	X	+X	XXX	+XXXX
ACDR	ACMR	ACYRR	NEST	KODE	KUPDAT	NUM
-----	-----	------	-----	-----	-------	----

KODE = 2 (end of record).--

1-5	12-14	121-122	124-126	127-131
+XXXX	+XX	+X	XXX	+XXXX
NRECD	NYEAR	KODE	KUPDAT	NUM

KODE = 6 (maximum volume and peak discharge).--Maximum volume.

1-5	6-8	9-11	12-14	15-22	23-31	32-37
+XXXX	+XX	+XX	+XX	+XX.XXXX	+XX.XXXXX	+XXXX.
IWID	MDATE(I)	NDATE(I)	NYEAR	TDAY(I)	AMAX(I)	HRS

121-122	124-126	127-131
+X	XXX	+XXXX
KODE	KUPDAT	NUM

Peak discharge.

1-5	6-8	9-11	12-14	15-22	23-31	121-122	124-126	127-131
+XXXX	+XX	+XX	+XX	+XX.XXXX	+XX.XXXXX	+X	XXX	+XXXX
IWID	MP	NP	NYEAR	TP	PEAK	KODE	KUPDAT	NUM

KODE = 7 (daily summary).--

1-5	6-8	9-11	12-14	70-79	90-99	110-119
+XXXX	+XX	+XX	+XX	+XXX.XXXXX	+XXX.XXXXX	+XXX.XXXXX
IWID	MONTH	NDAY	NYEAR	AVGDR	ACDR	ACYRR

121-122	124-126	127-131
+X	XXX	+XXXX
KODE	KUPDAT	NUM

KODE = 8 (monthly flow-duration summary).--

1-5	6-8	12-14	69-78	79-88	89-98
+XXXX	+XX	+XX	+XXXX.XXXX	+XXXX.XXXX	+XXXX.XXXX
IWID	MONTHO	NYEAR	PER(J)	PER(J+1)	PER(J+2)

99-108	109-118	121-122	124-126	127-131
+XXXX.XXXX	+XXXX.XXXX	+X	XXX	+XXXX
PER(J+3)	PER(J+4)	KODE	KUPDAT	NUM

KODE = 9 (yearly flow-duration summary).--The output for KODE = 9 follows the exact format of KODE = 8.

PROGRAM C (MISCELLANEOUS HYDROLOGIC DATA REDUCTION PROGRAM)

Program Features

Program C contains four subroutines connected by a mainline calling routine. A control card, which precedes each group of data, directs program control to the appropriate subroutine. The four routines are identified as MOIST, LDUSE, WIND, and TEMP. A listing of the source program and a detailed description of the variables are given in appendix lists C1 and C2.

The MOIST subroutine determines percentage of soil moisture by volume when the counting rate, percentage standard, and calibration curve for the instrument being used are given.

The LDUSE subroutine summarizes land-use data, when field weights and corresponding land-use codes are given.

In the WIND subroutine the average windspeed in miles per hour is determined for (1) the time interval between consecutive readings, (2) the month, and (3) the year when time and total miles traveled are given.

In the TEMP subroutine the maximum and minimum temperature values are summarized in tabular form, when daily maximum-minimum temperature readings are given.

Mainline Program

The function of the mainline program is to call the subroutine specified by KCONTR. KCONTR is a one-digit integer having possible values of 1, 2, 3, 4, or 5. See the individual subroutines for the appropriate value for KCONTR.

Processing may be terminated by making KCONTR = 5 and placing this card at the end of the last group of data to be processed.

Subroutine MOIST

Input

The input consists of:

1. Control card.
2. Three tables containing coordinate points for two depth probes and one surface probe.
3. Basic soil moisture data.

Control card.--The control card contains a 1 in column 1, which allows branching from the calling routine to subroutine MOIST and must precede all soil moisture data.

Tables.--Percentage moisture by volume is obtained from calibration curves that relate counts as a percentage standard to known moisture contents. Given a specific value for the percentage of standard, then the percentage moisture by volume may be determined from either a calibration table or an algebraic equation of the relationship between percentage standard and percentage moisture content. The use of calibration tables has the advantage of versatility, especially if several different types of instruments are being used, each of which has a different calibration curve.

Three depth moisture probes and two surface moisture probes are available for use at the Blacksburg, Va., research station. These probes will be referred to hereafter as depth probe 1, 2, or 3, and surface probe 1 or 2. Each probe has a unique calibration curve. Calibration tables have been developed for depth probes 1 and 2, and surface probe 1. Two linear equations of the form $y = a + bx$ were found to adequately define the calibration curves for depth probe 3 and surface probe 2.

The program has been designed so that data collected from five instruments may be processed concurrently. The only requirements is that the data must be coded to agree with the loading order of the calibration tables (see METER, appendix list C2). The order of loading of the calibration tables must always be depth probe 1, 2, and surface probe 1. The selection of which probe is to be 1 or 2 is arbitrary. The calibration curves defined by algebraic equations are fixed and can only be changed by reprogramming the particular statements in question.

The formats for the three calibration tables are identical and the information contained in each table is illustrated below. Each card contains 10 five-digit data fields. The last card of each table must contain a nine in column 76. Decimal points must always be punched.

1-5	6-10	11-15	16-20	21-25	26-30
XXX.X	XX.X	XXX.X	XXX.X	XXX.X	XXX.X
DP(L, 1)	DP(L, 2)	DP(L+1, 1)	DP(L +1, 2)	DP(L +2, 1)	DP(L +2, 2)
DPN(L, 1)	DPN(L, 2)	DPN(L+1, 1)	DPN(L +1, 2)	DPN(L+ 2, 1)	DPN(L +2, 2)
SP(L, 1)	SP(L, 2)	SP(L+1, 1)	SP(L+1, 2)	SP(L+2, 1)	SP(L +2, 2)

31-35	36-40	41-45	46-50	51-75	76
XXX.X	XXX.X	XXX.X	XXX.X		X
DP(L +3, 1)	DP(L+3, 2)	DP(L+4, 1)	DP(L +4, 2)	Table identification	NEND
DPN(L +3, 1)	DPN(L+3, 2)	DPN(L+4,1)	DPN(L+ 4, 2)		
SP(L+3,1)	SP(L+3, 2)	SP(L+4, 1)	SP(L +4, 2)		

Basic data.--The information contained in the basic data card is illustrated below. The variable names are described in appendix list C2.

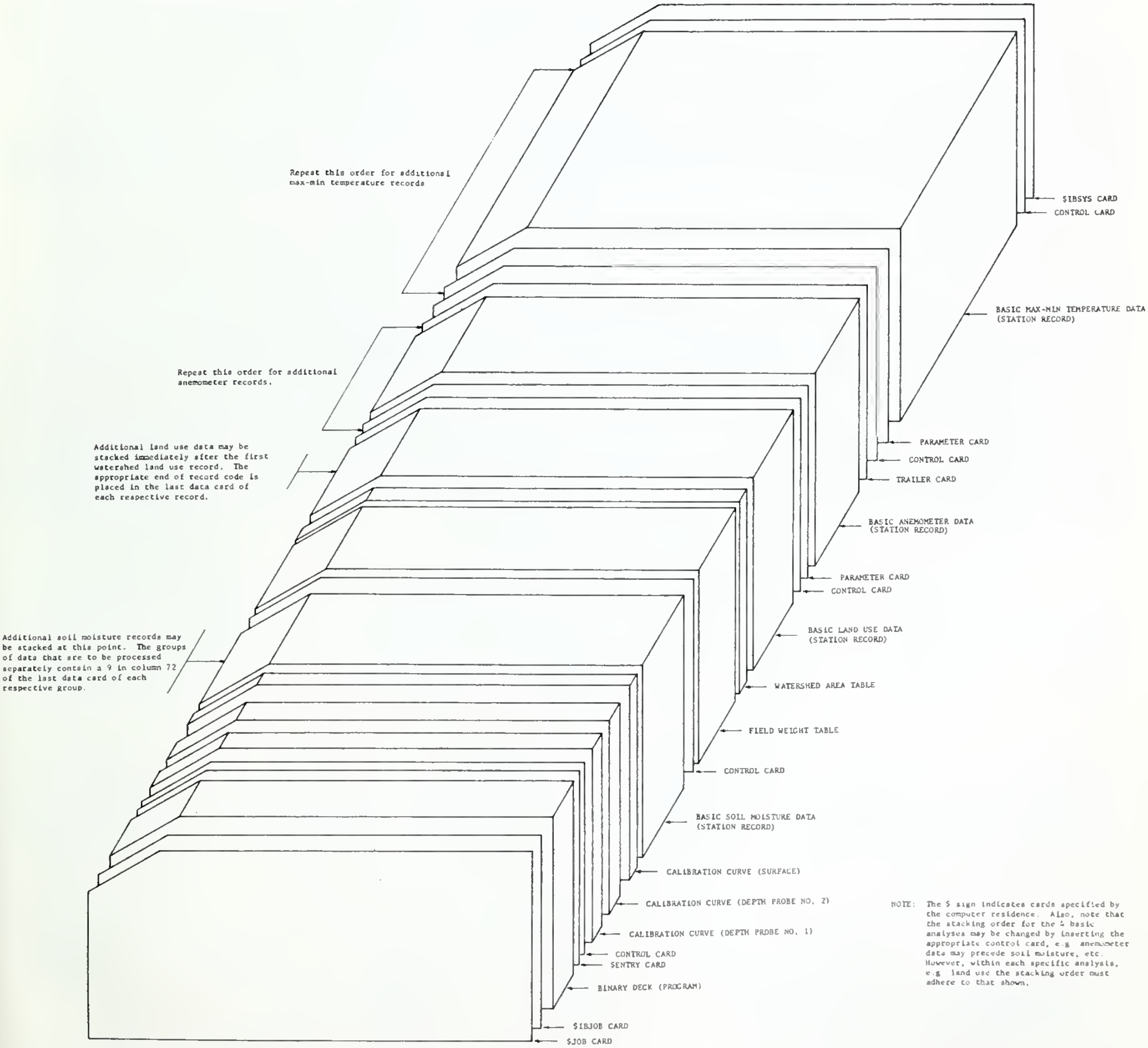
1	2-5	6-7	8-9	10-11	13-18	19-22	23-29	30-34
X	XXXX	XX	XX	XX	XXXXXX	XXXX	XXXXXXX	XXXXX.
METER	IWD	MO	ND	NYR	NSITE(I)	NTUBE(I)	ND1ND2(I)	COUNTS (I)

35-39	40-44	45-49	50-54	65	71-72	73-75
XXXXX.	XXXXX.	XXXXX.	XXXXX.	X	XX	XXX
COUNTS (I+1)	COUNTS (I+2)	COUNTS (I+3)	COUNTS (I+4)	KODE	NEND	NUP

Order of Input

The input data must be loaded as follows (also see figure C1):

1. Cards required by computer residence.
2. Object program.


$IBSYS CARD
CONTROL CARD
BASIC MAX-MIN TEMPERATURE DATA (STATION RECORD)
PARAMETER CARD
CONTROL CARD
TRAILER CARD
BASIC ANEMOMETER DATA (STATION RECORD)
PARAMETER CARD
CONTROL CARD
BASIC LAND USE DATA (STATION RECORD)
WATERSHED AREA TABLE
FIELD WEIGHT TABLE
CONTROL CARD
BASIC SOIL MOISTURE DATA (STATION RECORD)
CALIBRATION CURVE (SURFACE)
CALIBRATION CURVE (DEPTH PROBE NO. 2)
CALIBRATION CURVE (DEPTH PROBE NO. 1)
CONTROL CARD
$ENTRY CARD
BINARY DECK (PROGRAM)
$IBJOB CARD
$JOB CARD

Repeat this order for additional max-min temperature records

Repeat this order for additional anemometer records.

Additional land use data may be stacked immediately after the first watershed land use record. The appropriate end of record code is placed in the last data card of each respective record.

Additional soil moisture records may be stacked at this point. The groups of data that are to be processed separately contain a 9 in column 72 of the last data card of each respective group.

NOTE: The $ sign indicates cards specified by the computer residence. Also, note that the stacking order for the 4 basic analyses may be changed by inserting the appropriate control card, e.g. anemometer data may precede soil moisture, etc. However, within each specific analysis, e.g. land use the stacking order must adhere to that shown.

Figure C1.--Schematic diagram illustrating the stacking order for the input data required by program C. The computer residence cards are those required by the IBM 7040/1401 installation at Virginia Polytechnic Institute, Blacksburg, Va.

3. Control card.
4. Tables.
5. Basic data.
6. Repeat step 5 for additional groups of soil moisture data. Steps 1 and 2 may be eliminated if program has been loaded.

Data Preparation

Table C1 has been designed to serve as both a field note sheet and program code sheet. The readings are placed in their appropriate columns as they are being taken. This procedure eliminates unnecessary effort in preparing the data for card punching. The following coding must be adhered to:

1. METER equals 1 when using depth probe 1, and 2 when using depth probe 2. The calibration curves are also loaded in this order.
2. KODE must be one of the integers listed at the bottom of the code sheet (table C1).
3. When recording notes, the procedure is as follows: Place a 7 in column 65, skip to the next line and record notes in columns 13-64. If additional lines are needed, place a 7 in column 65 and continue to record notes. Column 65 will be blank for the last line of notes for any particular series of notes.
4. Place a 9 in column 72 of the last data card for intermediate station records. The last soil moisture data card must also contain a 9 in column 71 so that soil moisture processing will be terminated.

The data given in table C1 illustrate the above coding procedures.

Output

The output resulting from the input of table C1 is given in tables C2a and C2b. Note in table C2a that all field records are retained along with the desired output--percentage of soil moisture by volume. The percentages of soil moisture, along with the necessary identification, are placed on magnetic tape for permanent storage. An example listing of this data is shown in table C2b. The data is stored according to a 132-character card image. The output for the permanent storage tape (S.SU01) is shown below. This exact format may be used to read data from the storage tape. Also note that in this conjunction a $File card similar to the one shown in appendix list C1 for utility unit 01 would have to be used.

1-6	7-12	13-15	16-19	21-26	29-31	34-40	41-47
+XXXXX	+ XXXXX	+ XX	+XXX	XXXXXX	XXX	XXXXXXX	+XXXXX.
IWD	MO	ND	NYR	NSITE (I)	NTEBE (I)	NTEMP (I)	COUNTS (1)

48-54	55-61	62-68	69-75	76-84	85-93
+ XXXXX.	+ XXXXX.	+ XXXXX.	+XXXXX.	+ XXXXXXX.	+XXXXXX.X
COUNTS (2)	COUNTS (3)	COUNTS (4)	COUNTS (5)	SUMC	AVG

94-104	105-116	125-127	128-132
+XXXXXXX.XX	+ XXXXXXXX.XX	XXX	+ XXXX
PCSTD	PCMOIS	NUP	NCONT

TABLE C1. -- Code sheet for recording soil moisture data (input for subroutine MOIST, program C)

Location *Crab Creek* Sheet *1* of *1*

METER	IWD	MO	ND	NYR	NSITE	NTUBE	ND1 ND2	COUNTS(1)	COUNTS(2)	COUNTS(3)	COUNTS(4)	COUNTS(5)	KODE	NEND	NUP	NUM
1	2 3 4 5	6 7	8 9	10 11	13 14 15 16 17 18	20 21 22	23 24 25 26 27 28 29	30 31 32 33 34	35 36 37 38 39	40 41 42 43 44	45 46 47 48 49	50 51 52 53 54	65	71 72	73 74 75	76 77 78 79 80
1	1307	08	16	65									7		M07	1
1	1307	08	16	65	SUNNY, CLEAR, WARM BEGAN TIME 0830 E.D.T.								0		M07	2
1	1307	08	16	65				13722	13792	13859			3		M07	3
1	1307	08	16	65	SM-3	A	12IN.	05095	05089				1		M07	4
1	1307	08	16	65	SM-3	A	24IN.	10749	10841				1		M07	5
1	1307	08	16	65	SM-3	A	48IN.	13676	13590				1		M07	6
1	1307	08	16	65	SM-3	B	12IN.	06261	06180				1		M07	7
1	1307	08	16	65	SM-3	B	24IN.	11670	11528				1		M07	8
1	1307	08	16	65	SM-3	B	48IN.	13796	13893				1		M07	9
1	1307	08	16	65				09963	10012	10108			4		M07	10
1	1307	08	16	65	SM-3		SURFACE	06895	06746				2		M07	11
1	1307	08	16	65	SM-2		SURFACE	06514	06553				2		M07	12
1	1307	08	16	65	SM-2	A	12IN.	10066	09875				1		M07	13
	⋮				⋮		⋮	⋮	⋮				⋮		⋮	⋮
1	1307	08	16	65	SM-4	B	48IN.	11926	11981				1		M07	32
1	1307	08	16	65				09988					6		M07	33
1	1307	08	16	65				13808					5		M07	34
1	1307	08	16	65									7		M07	35
1	1307	08	16	65	END TIME 1118 E.D.T. ANKLE NO. 1 J.C.C.								0	99	M07	36

Values for KODE:

- 0-No Notes To Follow
- 1-Depth Probe Reading
- 2-Surface Reading
- 3-Depth Standard Reading
- 4-Surface Standard Reading
- 5-Check Depth Standard Reading
- 6-Check Surface Standard Reading
- 7-Notes To Follow

Notes May Be Written in Columns 13-64

TABLE C2A. -- SOIL MOISTURE OUTPUT RESULTING FROM THE INPUT DATA GIVEN IN TABLE C1 FORMAT FOR LISTING BY IBM 1401 ONLY (S.SU06)

```
                                                                                                              PAGE   1
                                  SOIL MOISTURE DATA'WATERSHED ENGINEERING'BLACKSBURG,VA.

 WSHD NO. MD DAY YR.  SITE  TIDE   OEPTH                CCUNTS                      SUM   AVERAGE  PC STANDARO  PC MOISTURE LIST NO.
   1307      8 16  65  SUNNY, CLEAR,WARM  BEGAN TIME 0830 E.D.T.                                                            MO7    1
   1307      8 16  65       CEPTH STANOARO 13722. 13792. 13859.                   41373.  13791.0                            MO7    2
   1307      8 16  65  SM-3  A        12IN  5095.  5089.                          10184.   5092.0      36.92       15.85      MO7    3
   1307      8 16  65  SM-3  A        24IN 10749. 10841.                          21590.  10795.0      78.28       37.37      MO7    4
   1307      8 16  65  SM-3  A        48IN 13676. 13590.                          27266.  13633.0      98.85       50.88      MO7    5
   1307      8 16  65  SM-3  8        12IN  6261.  6180.                          12441.   6220.5      45.11       19.64      MO7    6
   1307      8 16  65  SM-3  8        24IN 11670. 11528.                          23198.  11599.0      84.11       41.06      MO7    7
   1307      8 16  65  SM-3  8        48IN 13796. 13893.                          27689.  13844.5     100.39       51.93      MO7    8
   1307      8 16  65     SUPFACE STANDARD  9963. 10012. 1C108.                   30083.  10027.7                            MO7    9
   1307      8 16  65  SM-3          SURFACE  6895.  6746.                          13641.   6820.5      68.02       17.81      MO7   10
   13C7      8 16  65  SM-2          SURFACE  6514.  6553.                          13067.   6533.5      65.15       15.42      MO7   11
   1307      8 16  65  SM-2  A        12IN 1C066.  9875.                          19941.   9970.5      72.30       33.78      MO7   12
   1307      8 16  65  SM-2  A        24IN 12578. 12543.                          25121.  12560.5      91.08       45.55      MO7   13
   1307      8 16  65  SM-2  A        48IN 13049. 13106.                          26155.  13077.5      94.83       48.10      MO7   14
   1307      8 16  65  SM-2  8        12IN  8351.  8528.                          16879.   8439.5      61.20       27.58      MO7   15
   13C7      8 16  65  SM-2  8        24IN 13264. 13177.                          26441.  13220.5      95.86       48.82      MO7   16
   1307      8 16  65  SM-2  8        48IN 14537. 14460.                          28997.  14498.5     105.13       55.40      MO7   17
   1307      8 16  65  SM-1  A        12IN  6475.  6578.                          13C53.   6526.5      47.32       20.63      MO7   18
   1307      8 16  65  SM-1  A        24IN 11066. 11132.                          22198.  11099.0      80.48       38.69      MO7   19
   1307      8 16  65  SM-1  A        48IN 1160C. 11578.                          23178.  11589.0      84.03       41.02      MO7   20
   1307      8 16  65  SM-1  8        12IN  4863.  4942.                           9805.   4902.5      35.55       15.22      MO7   21
   1307      8 16  65  SM-1  8        24IN  9543.  9527.                          19C70.   9535.0      69.14       31.98      MO7   22
   1307      8 16  65  SM-1  8        48IN 12495. 12614.                          25109.  12554.5      91.03       45.52      MO7   23
   1307      8 16  65  SM-1          SURFACE  6232.  6289.                          12521.   6260.5      62.43       13.15      MO7   24
   1307      8 16  65  SM-4          SURFACE  6814.  6959.                          13773.   6886.5      68.67       18.34      MO7   25
   1307      8 16  65  SM-4  A        12IN  9600.  9702.                          193C2.   9651.0      69.98       32.49      MO7   26
   1307      8 16  65  SM-4  A        24IN 12997. 12971.                          25968.  12984.0      94.15       47.69      MO7   27
   1307      8 16  65  SM-4  A        48IN 13481. 13551.                          27032.  13516.0      98.01       5C.20      MO7   28
   1307      8 16  65  SM-4  8        12IN  9840.  9911.                          19751.   9875.5      71.61       33.36      MO7   29
   1307      8 16  65  SM-4  8        24IN 12877. 12959.                          25836.  12918.0      93.67       47.34      MO7   30
   1307      8 16  65  SM-4  8        48IN 11926. 11981.                          23907.  11953.5      86.68       42.71      MO7   31
   1307      8 16  65 CK SURFACE STANDARD  9988.                                   9988.   9988.0                            MO7   32
   1307      8 16  65   CK CEPTH STANOARO 138C8.                                  13808.  138C8.0                            MO7   33
   1307      8 16  65  ENC TIME 1118E.D.T.    ANKLE NO. 1 J.C.C.                                                            MO7   34
```

TABLE C2B. -- SOIL MOISTURE OUTPUT RESULTING FROM THE INPUT DATA GIVEN IN TABLE C1 FORMAT FOR PERMANENT STORAGE (S.SUOO)

```
   1307      8 16   65    SM-3     A    12IN  5095.  5089.   -0.    -0.    -0.   10184.   5092.0     36.92       15.85        MO7    1
   1307      8 16   65    SM-3     A    24IN 1C749. 10841.   -0.    -C.    -0.   21590.  10795.0     78.28       37.37        MO7    2
   1307      8 16   65    SM-3     A    48IN 13676. 13590.   -0.    -C.    -0.   27266.  13633.0     98.85       50.88        MO7    3
   1307      8 16   65    SM-3     B    12IN  6261.  6180.   -0.    -0.    -0.   12441.   6220.5     45.11       19.64        MO7    4
   1307      8 16   65    SM-3     B    24IN 1167C. 11528.   -0.    -C.    -0.   23196.  11599.0     84.11       41.06        MO7    5
   1307      8 16   65    SM-3     B    48IN 13796. 13893.   -0.    -C.    -0.   27689.  13844.5    100.39       51.93        MO7    6
   13C7      8 16   65    SM-3           0IN  6895.  6746.   -0.    -C.    -0.   13641.   6820.5     68.02       17.81        MO7    7
   1307      8 16   65    SM-2           0IN  6514.  6553.   -0.    -U.    -0.   13067.   6533.5     65.15       15.42        MO7    8
   1307      8 16   65    SM-2     A    12IN 1C066.  9875.   -0.    -C.    -0.   19941.   9970.5     72.30       33.78        MO7    9
   1307      8 16   65    SM-2     A    24IN 12578. 12543.   -0.    -C.    -0.   25121.  12560.5     91.08       45.55        MO7   10
   1307      8 16   65    SM-2     A    48IN 13049. 13106.   -0.    -C.    -0.   26155.  13077.5     94.83       48.10        MO7   11
   1307      8 16   65    SM-2     B    12IN  8351.  8528.   -0.    -0.    -0.   16879.   8439.5     61.20       27.58        MO7   12
   1307      8 16   65    SM-2     B    24IN 13264. 13177.   -0.    -C.    -0.   26441.  13220.5     95.86       48.82        MO7   13
   1307      8 16   65    SM-2     B    48IN 14537. 14460.   -0.    -C.    -0.   28997.  14498.5    105.13       55.40        MO7   14
   1307      8 16   65    SM-1     A    12IN  6475.  6578.   -0.    -C.    -0.   13053.   6526.5     47.32       20.63        MO7   15
   1307      8 16   65    SM-1     A    24IN 11066. 11132.   -0.    -0.    -0.   22198.  11099.0     80.46       38.69        MO7   16
   1307      8 16   65    SM-1     A    48IN 116CC. 11578.   -0.    -0.    -0.   23178.  11589.0     84.03       41.02        MO7   17
   1307      8 16   65    SM-1     B    12IN  4863.  4942.   -0.    -C.    -0.    9805.   4902.5     35.55       15.22        MO7   18
   1307      8 16   65    SM-1     B    24IN  9543.  9527.   -0.    -C.    -0.   19076.   9535.0     69.14       31.98        MO7   19
   1307      8 16   65    SM-1     B    48IN 12495. 12614.   -0.    -0.    -0.   25109.  12554.5     91.03       45.52        MO7   20
   1307      8 16   65    SM-1           0IN  6232.  6289.   -0.    -C.    -0.   12521.   6260.5     62.43       13.15        MO7   21
   1307      8 16   65    SM-4           0IN  6814.  6959.   -0.    -0.    -0.   13773.   6886.5     68.67       18.34        MO7   22
   1307      8 16   65    SM-4     A    12IN  9600.  9702.   -0.    -C.    -0.   19302.   9651.0     69.98       32.49        MO7   23
   1307      8 16   65    SM-4     A    24IN 12997. 12971.   -0.    -0.    -0.   25968.  12984.0     94.15       47.69        MO7   24
   1307      8 16   65    SM-4     A    48IN 13481. 13551.   -0.    -0.    -0.   27032.  13516.0     98.01       50.20        MO7   25
   1307      8 16   65    SM-4     B    12IN  9840.  9911.   -0.    -C.    -0.   19751.   9875.5     71.61       33.36        MO7   26
   1307      8 16   65    SM-4     B    24IN 12877. 12959.   -0.    -C.    -0.   25836.  12918.0     93.67       47.34        MO7   27
   1307      8 16   65    SM-4     B    48IN 11926. 11981.   -0.    -0.    -0.   23907.  11953.5     86.68       42.71        MO7   28
```

Subroutine LDUSE

Input

The input for this routine consists of:

1. Control card.
2. Field weight table.
3. Watershed area table.
4. Basic data.

Control card.--The control card contains a 2 in column 1 which allows branching from the calling routine to subroutine LDUSE and must precede all land-use data.

Field weight table.--The procedure to be followed in developing the field weight table may be grouped into the following steps:

1. Obtain a map of watershed showing individual field boundaries. Aerial photographs are usually the best source of this information.
2. Use a transparent overlay (preferably a plastic sheet about 0.017-inch thickness) and outline with ink the major fields within watershed and assign field numbers.
3. Subdivide these major fields by land-use practice. This will remain reasonably stable with time; however, changes in land use may require altering the original major field and subdivision boundaries at some later date.
4. Code each field subdivision following the key listed at the bottom of table C3.
5. Obtain reproduced copies of the overlay and preserve the overlay for use as a base map in future land-use surveys.
6. Use the reproduced prints, cut out the individual subdivisions and weigh each of the nearest ten-thousandth of a gram (0.0001 gram).
7. Place the resulting weight values on a code sheet similar to that shown in table C4. If the major field contains only one land use, the total field weight will be placed in WTS(1). When more than one land use occurs, WTS(1) is left blank and the field weights of the field subdivisions for the respective land uses are placed in WTS (2) through WTS (7). The total field weight becomes COMP.

After the field weight table has been developed, it should be saved for continued use. It must, however, be updated whenever there is a change in the physical dimensions of either the major field or its subdivisions, When making these changes use the same reproduction material that was used to develop the original table. After updating the boundaries of a major field, the new weight replaces the old reference weight. The boundaries of adjacent fields will also have changed and also must have a new reference weight determined. In determining the new reference weights, the ratio of the sum of the new reference weights to the total watershed weight must equal the ratio of the sum of the old weights to the total watershed weight. The analytical formulation would be:

$$\frac{\sum_{i=1}^{N} WNi}{WT} = \frac{\sum_{i=1}^{L} WOi}{WT}$$

Where:

WNi = Weight of the ith subdivision from the new major field.
WOi = Weight of the ith subdivision from the old major field.
WT = Total watershed weight.
N, L = Number of subdivisions.
i = Index enumerating individual subdivisions.

The information contained in the field weight table is given in the format listed below. See appendix list C2 for a description of the variables. Each card may contain a maximum of seven weights (WTS).

1-4	9-11	16-21 ------ 52-57	58-63	66-67
XXXX	XXX	XX.XXXX ---- XX.XXXX	XX.XXXX	XX
IDW2	NFN2	WTS (I) ----- WTS (I +6)	COMP	NEND

TABLE C3. -- Code sheet for recording land use data (input for subroutine LDUSE, program C)

thorne Creek
Location Crab Creek

Sheet 1 of 1

ID1		ID2		MO		ND		NYR		NFN				LUSE(1)		LUSE(2)		LUSE(3)		LUSE(4)		LUSE(5)		LUSE(6)		LUSE(7)		NEND	
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	79	80
1	3	0	6	0	9	0	8	6	5				1		4														
1	3	0	6	0	9	0	8	6	5				2		4														
1	3	0	6	0	9	0	8	6	5				3		4														
1	3	0	6	0	9	0	8	6	5				4		4														
1	3	0	6	0	9	0	8	6	5				5		4														
1	3	0	6	0	9	0	8	6	5				6		3														
1	3	0	6	0	9	0	8	6	5				7		3														
					⋮								⋮																
					⋮								⋮																
1	3	0	6	0	9	0	8	6	5			1	8				4		7		2		4						
					⋮								⋮																
					⋮								⋮																
1	3	0	6	0	9	0	8	6	5		4	5	0		8														
1	3	0	6	0	9	0	8	6	5		4	5	1		4														
1	3	0	6	0	9	0	8	6	5		4	5	2		4														
1	3	0	6	0	9	0	8	6	5		4	5	3		4														9
1	3	0	7	0	8	2	6	6	5				1				4		6		6								
1	3	0	7	0	8	2	6	6	5				2		4														
1	3	0	7	0	8	2	6	6	5				3				4		6										
1	3	0	7	0	8	2	6	6	5				4		3														
1	3	0	7	0	8	2	6	6	5				5		3														
					⋮								⋮																
					⋮								⋮																
1	3	0	7	0	8	2	6	6	5			7	0		4														
1	3	0	7	0	8	2	6	6	5			7	1		4														
1	3	0	7	0	8	2	6	6	5			7	2		4														
1	3	0	7	0	8	2	6	6	5			7	3		8														
1	3	0	7	0	8	2	6	6	5			7	4		3														
1	3	0	7	0	8	2	6	6	5			7	5		3														
1	3	0	7	0	8	2	6	6	5			7	6		3														
1	3	0	7	0	8	2	6	6	5			7	7		3													9	9

KEY:
1 - Small Grain
2 - Corn
3 - Hay
4 - Pasture
5 - Tobacco
6 - Woods
7 - Idle
8 - Roads
9 - Soybeans
10 - Cotton
11 - Sorghum
12 - Fallowed
13 -
14 -
15 -

TABLE C4. -- Code sheet for recording field weight table (for subroutine LDUSE, program C)

Date 7-15-66

Sheet 1 of 1

IDW2	NFN2	WTS(1)	WTS(2)	WTS(3)	WTS(4)	WTS(5)	WTS(6)	WTS(7)	COMP	NEND	KUPDAT	NUM
1 2 3 4	9 10 11	16 17 18 19 20 21	22 23 24 25 26 27	28 29 30 31 32 33	34 35 36 37 38 39	40 41 42 43 44 45	46 47 48 49 50 51	52 53 54 55 56 57	58 59 60 61 62 63	66 67	73 74 75	76 77 78 79 80
1306	1	0147							0147		L06	1
1306	2	0095							0095		L06	2
1306	3	0054							0054		L06	3
1306	4	0065							0065		L06	4
1306	5	0513							0513		L06	5
1306	6	0485							0485		L06	6
1306	7	0951							0951		L06	7
⋮												⋮
1306	18		0023	0017	0008	0034			0082		L06	18
⋮												⋮
1306	450	1559							1559		L06	450
1306	451	0047							0047		L06	451
1306	452	0018							0018		L06	452
1306	453	0047							0047		L06	453
1307	1		0894	0177	0013				1084		L07	1
1307	2	0082							0082		L07	2
1307	3		2769	0275	0013				3057		L07	3
1307	4	0153							0153		L07	4
1307	5	0458							0458		L07	5
⋮												⋮
1307	70	0099							0099		L07	70
1307	71	0048							0048		L07	71
1307	72	0032							0032		L07	72
1307	73	0329							0329		L07	73
1307	74	0219							0219		L07	74
1307	75	0058							0058		L07	75
1307	76	0063							0063		L07	76
1307	77	0144							0144	99	L07	77

Tabulated by ________ Checked by ________

Watershed area.--The watershed area in acres is required to determine the number of acres in a given land use. The areas for all watersheds to be included in a given land-use analysis are loaded at the same time. The watershed code (I) and the area (acres) are placed on separate cards according to the format below. The program is set for a maximum of 15 area values;

however, additional storage may be obtained by increasing the dimension of AREA. Also note that decimals are not required and a 9 must be placed in column 80 of the last data card to be loaded. For a given watershed, I has the same numerical value as ID2.

1-2	4-9	80
XX	XXXX.XX	X
I	AREA (I)	NEND

Basic data.--The land use for each field subdivision defined in the FIELD WEIGHT TABLE is determined from field surveys and coded according to the key at the bottom of table C3. The land use for two watersheds is shown in abbreviated form in table C3. These data constitute the basic input for the subroutine LDUSE.

The input format is as follows:

1-2	3-4	5-6	7-8	9-10	11-14	15-16---------27-28	79-80
XX	XX	XX	XX	XX	XXXX	XX -----------XX	XX
ID1	ID2	MO	ND	NYR	NFN	LUSE (I) -----LUSE(I +6)	NEND

Order of Input

The order of input must be as follows (also see fig. C1):

1. Cards required by computer residence.
2. Objective deck (program).
3. Control card.
4. Field weight tables.
5. Watershed area table (1-15 cards).
6. Basic data.
7. Repeat step 6 for additional records.

Data Preparation

Several precautions to be taken while coding and loading the data for this program are as follows:

1. The basic data must be loaded in exactly the same order as the field weight table.

2. The field weight table and coded land-use data (basic data) must have the same number of fields and these field numbers must be in the sequence 1, 2, ..., n.

3. The watershed area table contains all areas that will be required during the processing of the land-use data for example, if 10 watersheds are being summarized, then 10 cards--one area per card--will be required. Note that I of the watershed area table must be synonymous to ID2 of basic data for a given watershed. The limits are: $0 < I\&ID2 \leq 15$

4. If the data from a series of watersheds are being processed, NEND = 9 for intermediate records and NEND = 99 for the last record. Note that these codes are placed only in the last basic data card. For all remaining cards NEND is left blank.

Output

The output consists of a summary of the percentage of the total watershed area in a specific land use. The output resulting from the input given in table C3 is shown in table C5.

Subroutine WIND

Input

Input to the anemometer reduction program consists of a control card, a parameter card, basic data cards, and a trailer card.

Control card.--The control card contains a 3 in column 1 which allows branching from the calling routine to subroutine WIND and must precede all anemometer data.

TABLE C5. -- LAND-USE OUTPUT RESULTING FROM THE INPUT DATA GIVEN IN ABBREVIATED FORM IN TABLES C3 AND C4

```
                                                                                         PAGE  1
             LAND USE SUMMARY'WATERSHED ENGINEERING'BLACKSBURG,VA.

WATERSHED  1306
AREA(ACS.) 3C54.00
DATE SURVEY MADE  9 -8-65

                  LAND USE(PCT)      LAND USE(ACRES)
 1.SMALL GRAIN        3.56            108.64399
 2.CORN               6.65            203.08466
 3.HAY               20.79            635.02881
 4.PASTURE           57.96           1770.20390
 5.TCBACCC            0.00              0.00000
 6.WOODS              4.40            134.31836
 7.ICLE               5.11            156.19579
 8.ROADS              1.03             31.31952
 9.SCY BEANS          0.00              0.00000
10.COTTCN             0.00              0.00000
11.SCRGHUM CANE       0.09              2.63172
12.FALLOWED           0.00              0.00000
13.                   0.27              8.17642
14.                   0.00              0.00000
15.                   0.00              0.00000

WATERSHED  1307
AREA(ACS.)  786.00
DATE SURVEY MADE  8-26-65

                  LAND USE(PCT)      LAND USE(ACRES)
 1.SMALL GRAIN        0.00              0.00000
 2.CCRN               4.48             35.19935
 3.HAY               22.77            178.97824
 4.PASTURE           57.48            451.80655
 5.TOBACCC            0.00              0.00000
 6.WCODS             12.78            1C0.43608
 7.IDLE               1.56             12.25970
 8.ROADS              0.93              7.32022
 9.SOY BEANS          0.00              0.00000
10.CCTTON             0.00              0.00000
11.SCRGHUM CANE       0.00              0.00000
12.FALLOWED           0.00              0.00000
13.                   0.00              0.00000
14.                   0.00              0.00000
15.                   0.00              0.00000
```

Parameter card.--The parameter card contains the last two digits of the year and station identification according to the following format.

1-2	3-68
XX.	(See note)
YR	IDENT (I)

Note: Columns 3-68 are reserved for appropriate station identification, for example, CRAB CREEK (WIND), BLACKSBURG, VA.

Basic data.--Basic anemometer data collected at the Crab Creek watershed, Blacksburg, Va., are given in table C6. These data may be key-punched directly from this code sheet according to the format listed below. Decimals are not punched.

1-2	3-4	6-7	8-9	12-17	19	79-80
XX	XX	XX.	XX.	XXXXX.X	X	XX
MON	NDAY	HR	TMIN	AMON	KODE	NEND

Trailer card.--The trailer card is used to terminate processing and contains either a 9 or 99 in columns 79-80.

79-80
XX
NEND

Order of Input

The order of input is as follows (also see fig. C1):

1. Cards specified by the computer residence.
2. Control card.
3. Parameter card.
4. Basic data cards.
5. Trailer card.
6. Repeat steps 3 to 5 for additional station records.

Output

Table C7 illustrates the type and form of the output from this program. The information contained in each line is given below.

2-4	5-7	8-10	11-16	17-27	28-36	37-46
+XX	+XX	+XX	+XXXXX	+XXXXXX.XXXX	+XXXXXX.X	+XXXXXXX.X
MON	NNDAY	NYR	LTIME	TI	AMON	DT

47-55	56-66	67-75	76-83	84-95	96-103
+XXXXX.XX	+XXXXXX.XXXX	+XXXXXX.X	+XXXX.XX	+XXXXXX.XXXX	+XXXXX.X
AV	STI	SD	AVM	STIYR	SDYR

104-111	114-119
+XXXX.XX	+XXXX
AVYR	NUM

Note: Positions 56-83 contain data only for the end of month summary, and positions 84-111 contain data only for the end of year summary.

TABLE C6. -- Code sheet for recording anemometer data (input for subroutine WIND, program C)

Location Crab Creek Date 7-10-66 Sheet 1 of 1

MON		NDAY		HR		TMIN		AMON						KODE	NEND	
1	2	3	4	6	7	8	9	12	13	14	15	16	17	19	79	80
0	1	0	1	0	0	0	0		4	0	0	0	0			
0	1	0	4	0	9	1	3		4	2	7	0	1			
0	1	1	1	0	9	1	0		4	7	2	0	5	9		
0	1	1	8	1	0	1	8		5	2	7	0	7			
0	1	2	5	0	9	1	2		5	9	4	9	9			
0	2	0	1	0	9	4	3		6	7	0	7	8			
		⋮									⋮					
		⋮									⋮					
		⋮									⋮					
0	9	1	0	1	0	0	8	1	7	9	5	2	0			
0	9	2	0	1	0	2	2	1	8	2	0	0	1			
0	9	2	7	0	9	5	9	1	8	4	1	9	4			
1	0	0	4	0	9	2	5	1	8	7	5	8	7			
		⋮									⋮					
		⋮									⋮					
		⋮									⋮					
1	2	3	0	0	9	1	1	2	3	8	0	8	7			
1	2	3	1	2	4	0	0	2	3	9	2	4	5			
															9	9

Tabulated by ________ Checked by ________

TABLE C7. -- ANEMOMETER OUTPUT RESULTING FROM THE INPUT DATA GIVEN IN TABLE C6

```
     CRAB CREEK (WIND)  BLACKSBURG, VA

                                 ANEMOMETER COMPUTATIONS'WATERSHED ENGINEERING'BLACKSBURG,VA.

  DATE    TIME     TIME    ANEMOMETER  DIST TRV AVG RATE TIME INTV DIST TRV AVG RATE TIME INTV DIST TRV AVG RATE SEQ.
MO DA YR         INTV(HRS) DIST(MILES) FOR INTV  (MPH)     MONTH     MONTH    MONTH     YEAR      YEAR      YEAR    NO
 1 -1-65     0     0.0000    4000.0       0.0    0.00                                                              1
 1 -4-65   913    81.2167    4270.1     270.1    3.33                                                              2
 1-11-65   910   167.9500    4720.5  INSTRUEMENT FAILURE                                                           3
 1-18-65  1018   169.1333    5270.7     550.2    3.25                                                              4
 1-25-65   912   166.9000    5949.9     679.2    4.07                                                              5
 1-31-65  2400   158.8000    6707.8     714.2    4.50                                                              6
                                                        576.0500    2213.7    3.84                                 7
 2 -1-65   943     9.7167    6707.8      43.7    4.50                                                              8
 2 -8-65   530   163.7833    7271.7     563.9    3.44                                                              9
 2-15-65  1030   173.0000    7844.0     572.3    3.31                                                             10
 2-22-65   940   167.1667    8505.0     661.0    3.95                                                             11
 2-28-65  2400   158.3333    9338.0     787.6    4.97                                                             12
                                                        672.0000    2628.5    3.91                                13
 3 -1-65   908     9.1333    9338.0      45.4    4.97                                                             14
 3 -8-65   926   168.3000    9853.3     515.3    3.06                                                             15
 3-14-65  1406   148.6667   10357.1     503.8    3.39                                                             16
 3-22-65   945   187.6500   11141.8     784.7    4.18                                                             17
 3-29-65  1407   172.3666   11908.7     766.9    4.45                                                             18
 3-31-65  2400    57.8834   12491.3     207.1    3.58                                                             19
                                                        744.0000    2823.3    3.79                                20
 4 -5-65   856   104.9333   12491.3     375.5    3.58                                                             21
 4-12-65  1357   173.0167   13148.0     656.7    3.80                                                             22
 4-19-65  1451   168.9000   14008.6     860.6    5.10                                                             23
 4-26-65   951   163.0000   14466.6     458.0    2.81                                                             24
 4-30-65  2400   110.1500   14937.4     310.3    2.82                                                             25
                                                        720.0000    2661.0    3.70                                26
 5 -3-65   900    57.0000   14937.4     160.5    2.82                                                             27
 5-10-65  1010   169.1667   15142.7     205.3    1.21                                                             28
 5-17-65  1046   168.6000   15406.1     263.4    1.56                                                             29
 5-24-65  1200   169.2333   15554.7     148.6    0.88                                                             30
 5-31-65   918   165.3000   15714.9     160.2    0.97                                                             31
 5-31-65  2400    14.7000   15936.5      19.2    1.31                                                             32
                                                        744.0000     957.3    1.29                                33
 6 -7-65  1045   154.7500   15936.5     202.4    1.31                                                             34
 6-14-65   930   166.7500   16084.5     148.0    0.89                                                             35
 6-21-65   810   166.6666   16285.1     200.6    1.20                                                             36
 6-28-65   800   167.8334   16459.5     174.4    1.04                                                             37
 6-30-65  2400    64.0000   16631.3      64.7    1.01                                                             38
                                                        720.0000     790.1    1.10                                39
 7 -5-65   958   105.9666   16631.3     107.1    1.01                                                             40
 7-12-65  1150   169.8667   16787.5     156.2    0.92                                                             41
 7-19-65  1505   171.2500   16898.1     110.6    0.65                                                             42
 7-26-65  1050   163.7500   16977.5      79.4    0.48                                                             43
 7-31-65  2400   133.1667   17097.8      93.4    0.70                                                             44
                                                        744.0000     546.7    0.73                                45
 8 -2-65  1426    38.4333   17097.8      26.9    0.70                                                             46
 8 -9-65   738   161.2000   17173.0      75.2    0.47                                                             47
 8-16-65   843   169.0833   17261.2      88.2    0.52                                                             48
 8-23-65   915   168.5334   17398.1     136.9    0.81                                                             49
 8-30-65  1130   170.2500   17594.4     196.3    1.15                                                             50
 8-31-65  2400    36.5000   17768.7      67.8    1.86                                                             51
                                                        744.0000     591.3    0.79                                52
 9 -3-65   920    57.3333   17768.7     106.5    1.86                                                             53
 9-10-65  1008   168.8000   17952.0     183.3    1.09                                                             54
 9-20-65  1022   240.2333   18200.1     248.1    1.03                                                             55
 9-27-65   959   167.6166   18419.4     219.3    1.31                                                             56
 9-30-65  2400    86.0167   18758.7     174.3    2.03                                                             57
                                                        720.0000     931.5    1.29                                58
10 -4-65   925    81.4166   18758.7     165.0    2.03                                                             59
10-11-65   955   168.5000   19053.3     294.6    1.75                                                             60
10-18-65   925   167.5000   19232.2     178.9    1.07                                                             61
10-25-65  1242   171.2833   19604.1     371.9    2.17                                                             62
10-31-65  2400   155.3000   19973.4     348.9    2.25                                                             63
                                                        744.0000    1359.3    1.83                                64
11 -1-65   904     9.0667   19973.4      20.4    2.25                                                             65
11 -8-65   919   168.2500   20252.4     279.0    1.66                                                             66
11-15-65  1055   169.6000   20541.6     289.2    1.71                                                             67
11-22-65  1125   168.5000   21063.9     522.3    3.10                                                             68
11-29-65   937   166.2000   21683.6     619.7    3.73                                                             69
11-30-65  2400    38.3834   22172.8     112.0    2.92                                                             70
                                                        720.0000    1842.6    2.56                                71
12 -6-65   912   129.2000   22172.8     377.2    2.92                                                             72
12-13-65   940   168.4667   22719.2     546.4    3.24                                                             73
12-20-65   940   168.0000   23086.7     367.5    2.19                                                             74
12-22-65  1410    52.5000   23190.6     103.9    1.98                                                             75
12-30-65   911   187.0166   23808.7     618.1    3.31                                                             76
12-31-65  2400    38.8168   23924.5     115.8    2.98                                                             77
                                                        744.0000    2128.9    2.66                                78
                                                                                  8592.0499  19474.1     2.27     79
```

Subroutine TEMP

Input

The input for this routine consists of one control card, one parameter card, and basic data cards.

Control card.--The control card contains a 4 in column 1, which allows branching from the calling routine to subroutine TEMP and must precede all maximum-minimum temperature data.

Parameter card.--The parameter card contains the year of record and station identification and must always precede each station record. The form is as follows:

1-2	3-68
XX.	(See note)
YR	ID (I)

Note: Columns 3-68 are reserved for station identification or location, for example, CRAB CREEK, VA.

Basic data.--The basic data consist of daily maximum and minimum temperature readings arranged according to the following format:

1-2	3-4	6-8	10-12	79-80
XX	XX	XXX.	XXX.	XX
MO	ND	AMAX (MO,ND)	AMIN (MO,ND)	NEND

Data Preparation

Data are placed on the code sheet illustrated by table C8 as they are read in the field or are being recorded from charts in the office.

The following coding must be adhered to:

1. The last two digits of the year must be placed in columns 1-2 of the parameter card. The remaining identification is arbitrary. This card precedes each year's record.
2. If more than 1 year's record is to be processed, place a 9 in column 80 of the last data card of the intermediate station. The last card of the last station will contain a 99 in columns 79-80.

The maximum-minimum temperature data for Crab Creek watershed are given in abbreviated form in table C8 to illustrate data preparation.

Order of Input

The input data must be arranged in the following order (also see fig. C1):

1. Cards specified by computer residence.
2. Objective deck program.
3. Control card.
4. Parameter card.
5. Basic data.
6. Repeat steps 4-5 for additional records.

Output

The output from this program is listed directly from the IBM 7040 computer by an IBM 1401 data processing machine. Typical output is presented in table C9.

TABLE C8. -- Code sheet for recording maximum-minimum temperature data (input for subroutine TEMP, program C)

Location Crab Creek Date 7-13-66 Sheet 1 of 1

MO		ND		AMAX(MO,ND)			AMIN(MO,ND)			NEND	
1	2	3	4	6	7	8	10	11	12	79	80
0	1	0	1		3	9		3	0		
0	1	0	2		5	8		3	2		
⋮					⋮				⋮		
⋮					⋮				⋮		
0	1	3	0		2	7		1	0		
0	1	3	1		2	0		-	2		
0	2	0	1		2	7			0		
0	2	0	2		2	7			7		
⋮					⋮				⋮		
⋮					⋮				⋮		
0	8	1	6		9	2		6	9		
0	8	1	7		9	2		6	7		
0	8	1	8		9	0		6	7		
⋮					⋮				⋮		
⋮					⋮				⋮		
1	2	2	8		4	6		2	6		
1	2	2	9		5	0		2	4		
1	2	3	0		6	2		3	0		
1	2	3	1		6	4		3	6	9	9

Tabulated by__________ Checked by_____

TABLE C9. -- MAXIMUM - MINIMUM TEMPERATURE OUTPUT RESULTING FROM THE INPUT DATA GIVEN IN ABBREVIATED FORM IN TABLE C8

```
 CRAB CREEK,VA.
YEAR  1965
                         MAXIMUM-MINIMUM TEMPERATURE COMPUTATIONS'WATERSHED ENGINEERING'BLACKSBURG,VA.

                                                           MAXIMUMS
                         DATE  JAN.  FEB.  MAR.  APR.  MAY   JUNE  JULY  AUG. SEPT.  OCT.  NOV.  DEC.
                            1  39.0  27.0  63.0  47.0  80.0  81.0  78.0  81.0  75.0  76.0  50.0  39.0
                            2  58.0  27.0  49.0  46.0  78.0  82.0  78.0  74.0  70.0  67.0  60.0  53.0
                            3  39.0  23.0  57.0  52.0  85.0  74.0  80.0  76.0  70.0  68.0  71.0  43.0
                            4  45.0  27.0  45.0  51.0  83.0  63.0  79.0  85.0  70.0  53.0  65.0  39.0
                            5  50.0  38.0  33.0  70.0  78.0  70.0  63.0  84.0  68.0  58.0  58.0  52.0
                            6  52.0  59.0  30.0  70.0  82.0  82.0  85.0  88.0  70.0  63.0  66.0  45.0
                            7  52.0  54.0  41.0  75.0  75.0  80.0  82.0  85.0  77.0  53.0  67.0  35.0
                            8  63.0  65.0  44.0  70.0  78.0  80.0  85.0  81.0  83.0  64.0  64.0  51.0
                            9  59.0  52.0  39.0  68.0  83.0  82.0  88.0  80.0  84.0  61.0  60.0  56.0
                           10  42.0  57.0  36.0  69.0  84.0  86.0  84.0  76.0  87.0  55.0  45.0  55.0
                           11  36.0  63.0  40.0  65.0  80.0  79.0  78.0  80.0  77.0  72.0  50.0  64.0
                           12  44.0  61.0  45.0  75.0  71.0  80.0  75.0  86.0  68.0  64.0  48.0  61.0
                           13  44.0  49.0  49.0  56.0  74.0  78.0  84.0  86.0  78.0  62.0  61.0  64.0
                           14  30.0  28.0  51.0  60.0  76.0  76.0  85.0  86.0  80.0  72.0  57.0  44.0
                           15  26.0  41.0  51.0  60.0  78.0  61.0  81.0  89.0  83.0  76.0  56.0  48.0
                           16  21.0  47.0  59.0  53.0  82.0  54.0  84.0  92.0  82.0  75.0  60.0  46.0
                           17  21.0  47.0  46.0  67.0  80.0  70.0  85.0  92.0  80.0  62.0  58.0  44.0
                           18  24.0  56.0  65.0  76.0  78.0  66.0  81.0  90.0  84.0  60.0  36.0  40.0
                           19  32.0  46.0  45.0  56.0  79.0  72.0  62.0  86.0  84.0  66.0  49.0  36.0
                           20  40.0  47.0  31.0  62.0  76.0  80.0  76.0  85.0  78.0  66.0  56.0  31.0
                           21  49.0  56.0  33.0  70.0  70.0  81.0  80.0  70.0  82.0  61.0  48.0  36.0
                           22  59.0  29.0  50.0  70.0  79.0  84.0  85.0  82.0  80.0  69.0  50.0  50.0
                           23  58.0  44.0  64.0  80.0  83.0  86.0  88.0  78.0  72.0  56.0  53.0  58.0
                           24  57.0  35.0  58.0  63.0  83.0  79.0  90.0  78.0  72.0  40.0  48.0  56.0
                           25  51.0  39.0  44.0  48.0  86.0  72.0  86.0  78.0  60.0  54.0  44.0  55.0
                           26  64.0  23.0  66.0  75.0  86.0  72.0  84.0  82.0  67.0  63.0  58.0  36.0
                           27  39.0  52.0  53.0  64.0  82.0  72.0  83.0  85.0  62.0  60.0  58.0  42.0
                           28  45.0  62.0  65.0  48.0  80.0  86.0  84.0  79.0  58.0  50.0  50.0  46.0
                           29  38.0        62.0  59.0  68.0  86.0  75.0  68.0  72.0  45.0  36.0  50.0
                           30  27.0        52.0  71.0  70.0  81.0  79.0  72.0  68.0  64.0  32.0  62.0
                           31  20.0        52.0        77.0        74.0  74.0        65.0        64.0
  AVERAGE                      42.8  44.8  49.0  63.2  78.9  76.5  82.0  81.6  74.7  62.0  53.9  48.5
  MAXIMUM                      64.0  65.0  66.0  80.0  86.0  86.0  90.0  92.0  87.0  76.0  71.0  64.0
  AVERAGE OF MAXIMUM           31.0  32.5  37.0  51.5  66.0  67.0  73.0  66.0  61.0  47.0  44.5  39.5
  DAYS MAXIMUMS OCCURRED       26     8    26    23    25    10    24    16    10     1     3    11
                                                       26    23          17          15          13
                                                             28                                  31
                                                             29
```

```
 CRAB CREEK,VA.
YEAR  1965
                         MAXIMUM-MINIMUM TEMPERATURE COMPUTATIONS'WATERSHED ENGINEERING'BLACKSBURG,VA.

                                                           MINIMUMS
                         DATE  JAN.  FEB.  MAR.  APR.  MAY   JUNE  JULY  AUG. SEPT.  OCT.  NOV.  DEC.
                            1  30.0   0.0  28.0  29.0  50.0  54.0  59.0  62.0  54.0  52.0  40.0  15.0
                            2  32.0   7.0  31.0  26.0  58.0  56.0  56.0  59.0  51.0  44.0  32.0  23.0
                            3  28.0   4.0  32.0  23.0  54.0  54.0  65.0  53.0  53.0  44.0  28.0  34.0
                            4  26.0   9.0  33.0  38.0  55.0  54.0  63.0  56.0  50.0  36.0  39.0  26.0
                            5  25.0  11.0  24.0  36.0  57.0  56.0  61.0  58.0  57.0  30.0  32.0  26.0
                            6  36.0  28.0  22.0  54.0  60.0  57.0  60.0  60.0  54.0  28.0  33.0  28.0
                            7  31.0  44.0  27.0  53.0  60.0  61.0  65.0  63.0  49.0  45.0  37.0  22.0
                            8  42.0  52.0  30.0  47.0  56.0  63.0  64.0  65.0  50.0  43.0  36.0  20.0
                            9  42.0  43.0  31.0  48.0  59.0  63.0  64.0  66.0  57.0  39.0  44.0  28.0
                           10  28.0  40.0  23.0  42.0  60.0  61.0  64.0  60.0  55.0  41.0  38.0  38.0
                           11  25.0  51.0  20.0  50.0  58.0  63.0  64.0  56.0  65.0  38.0  38.0  34.0
                           12  23.0  49.0  28.0  53.0  52.0  64.0  63.0  58.0  63.0  35.0  43.0  48.0
                           13  26.0  27.0  22.0  42.0  53.0  60.0  60.0  63.0  63.0  28.0  44.0  40.0
                           14  18.0  21.0  25.0  38.0  48.0  56.0  65.0  67.0  60.0  39.0  40.0  37.0
                           15  11.0  17.0  28.0  43.0  52.0  52.0  66.0  67.0  63.0  41.0  32.0  36.0
                           16  15.0  23.0  30.0  39.0  59.0  50.0  62.0  69.0  63.0  44.0  48.0  40.0
                           17   9.0  34.0  31.0  34.0  61.0  50.0  58.0  67.0  62.0  44.0  26.0  30.0
                           18  14.0  36.0  32.0  49.0  58.0  48.0  59.0  67.0  62.0  41.0  22.0  30.0
                           19  10.0  16.0  31.0  44.0  57.0  48.0  61.0  65.0  60.0  44.0  34.0  20.0
                           20  21.0  13.0  14.0  42.0  57.0  52.0  60.0  64.0  60.0  50.0  27.0  19.0
                           21  24.0  24.0   8.0  39.0  60.0  54.0  60.0  62.0  60.0  53.0  37.0  24.0
                           22  31.0  15.0  22.0  51.0  58.0  59.0  61.0  67.0  64.0  51.0  40.0  26.0
                           23  45.0  18.0  37.0  52.0  59.0  61.0  66.0  66.0  62.0  40.0  32.0  31.0
                           24  40.0  25.0  44.0  45.0  61.0  64.0  66.0  64.0  52.0  35.0  29.0  41.0
                           25  37.0  16.0  35.0  42.0  63.0  57.0  71.0  62.0  41.0  28.0  34.0  26.0
                           26  39.0  15.0  35.0  44.0  62.0  53.0  67.0  64.0  35.0  29.0  40.0  22.0
                           27  20.0  19.0  29.0  45.0  64.0  57.0  67.0  64.0  43.0  33.0  36.0  17.0
                           28  19.0  34.0  37.0  43.0  58.0  61.0  62.0  51.0  46.0  30.0  32.0  26.0
                           29  23.0        52.0  42.0  49.0  64.0  62.0  40.0  48.0  20.0  21.0  24.0
                           30  10.0        34.0  45.0  46.0  63.0  58.0  42.0  48.0  18.0  18.0  30.0
                           31  -2.0        28.0        48.0        61.0  53.0        30.0        36.0
  AVERAGE OF MINIMUM           25.1  24.7  29.2  42.6  56.6  57.2  62.6  60.7  55.0  37.9  34.4  29.0
  MINIMUM                      -2.0   0.0   8.0  23.0  46.0  48.0  56.0  40.0  35.0  18.0  18.0  15.0
  AVERAGE OF MAXIMUM           31.0  32.5  37.0  51.5  66.0  67.0  73.0  66.0  61.0  47.0  44.5  39.5
  DAYS MINIMUMS OCCURRED       31     1    21     3    30    18     2    29    26    30    30     1
                                                             19
```

PROGRAM D (UPDATE PROGRAM)

Program Features

The update program was developed to allow easy reference and handling of data on magnetic tape, the transfer of data from tape to tape, and the transfer of data from cards to tape. The program may be used to process four separate record lengths: (1) 90-character records, (2) 131-character records, (3) 80-character records, (standard 80-column punchcard), and (4) 132-character records. Multiple tapes may be merged, rewritten, or corrected and the corrected data placed on multiple output tapes.

A listing of the source program and a detailed description of the program variables are given in appendix lists D1 and D2.

Input

The input to this program consists of parameter cards and basic data, which may be on either magnetic tape, punchcards, or both.

Parameter Card

The format for the parameter card follows:

1-3	4-8	9-11	12-16	17-19	20-23	24-25	26	27	28	29
XXX	XXXXX	XXX	XXXXX	XXX	XXXX	XX	X	X	X	X
UPB1	UPB2	UPE1	UPE2	UPCODE	NUMBER	INCR	NFL	NFOR	NEND	NC

Note: See the input section of appendix list D2 for definition of variables.

A code sheet to facilitate the preparation and keypunching of update parameter card data has been prepared and is depicted by table D1. The data shown in this table illustrate the coding required for the update example that is discussed in detail starting on page 51.

Basic Data

The basic input data will be data from programs A, B, or 80-character output/input. Refer to page 12 and page 28 (storage tape S.SU00) for the input format if data from programs A and B are used. During the update process all data are rewritten in the exact format of the input; consequently, when corrections are to be made, the data must be placed on punchcards in exactly the same form that it appears on magnetic tape. For the 90-, 131-, and 132-character records, two cards are required to represent one record. The format for these three records and the data contained in each field are listed below. All decimals and negative signs must be punched. The position for the positive sign is normally left blank.

90-character record--precipitation.--

First card--KODE = 0

1-4	6-7	8-10	11-13	14-16	17-24	25-34	35-42
XXXX	XX	+ XX	+XX	+XX	+XX.XXXX	+XXXX.XXXX	+ XX.XXXX
IWID	IGAGE	MONTH	NDAY	NYEAR	HR	TI	AI

43-50	51-58	59-66	67-74	77
+XX.XXXX	+XX.XXXX	+XX.XXXX	+XX.XXXX	X
ACP	STAC	DAC	AMAC	LTYPRE

TABLE D1. -- Code sheet for recording update parameter card data (input for program D)

Date 7-8-66 Sheet 1 of 1

UPB1			UPB2					UPE1			UPE2					UPCODE			NUMBER				INCR		NFL	NFOR	NEND	NC
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29
P	0	4					1	P	1	0			7	6	0										1	1	8	
P	1	2					1	P	1	2			5	0	0										1	1		
P	1	2			5	0	1	P	1	2			5	0	1										3	1		
P	1	2			5	0	2	P	1	2			9	0	0										1	1		
P	1	3					1	P	1	3			8	3	3										2	1		
P	1	4					1	P	2	0		1	0	1	2										1	1	8	
P	2	1					1	P	3	7			9	8	8										1	1		7
P	0	4					1	P	0	4			7	3	2										1	1	8	
P	0	5					1	P	0	5			7	8	5	P	4	0				1		2	2	1		
P	0	6					1	P	2	0		1	1	1	1										1	1	8	
P	2	1					1	P	3	6			6	7	7										1	1	8	
P	3	7					1	P	3	7			9	0	8										2	1	9	

Tabulated by________ Checked by________

Second card--KODE = 0

1-2	5-7	8-12
+X	XXX	+ XXXX
KODE	KUPDAT	NUM

First card--KODE = 2

1-4
+XXX
NRECD

Second card--KODE = 2

1-2	5-7	8-12
+X	XXX	+XXXX
KODE	KUPDAT	NUM

First and second card--KODE = 3. See note following second card--KODE = 9.

First card--KODE = 6

1-4	6-7	8-10	14-16	25-34	67-74
XXXX	XX	+XX	+XX	+XXXX.XXXX	+XX.XXXX
IWID	IGAGE	MONTHO	NYEAR	ACTI	AMAC

Second card--KODE = 6

1-2	5-7	8-12
+X	XXX	+XXXX
KODE	KUPDAT	NUM

First card--KODE = 7

1-4	6-7	14-16	25-34	67-74
XXXX	XX	+XX	+ XX.XXXX	+ XX.XXXX
IWID	IGAGE	NYEAR	ACTIYR	YRAC

Second card--KODE = 7

1-2	5-7	8-12
+X	XXX	+XXXX
KODE	KUPDAT	NUM

First card--KODE = 9. Note: There are two lines of maximum intensity data for each storm event ≧ 0.25 inch. The PI(7) -- PI(12) refers to the second line of output. Four cards would be required to correct both lines of data. The format of KODE = 3 is identical to KODE = 9 except PI(I) is replaced by RECI(I).

1-4	6-7	8-10	11-13	14-16	20-24	25-34	35-42
XXXX	XX	+XX	+XX	+ XX	+XXXX	+ XXXX.XX	+XX.XXXX
IWID	IGAGE	MONTH	NDAY	NYEAR	NRO	PI(1) PI(7)	PI(2) PI(8)

43-50	51-58	59-66	67-74
+XX.XXXX	+ XX.XXXX	+XX.XXXX	+ XX.XXXX
PI(3) PI(9)	PI(4) PI(10)	PI(5) PI(11)	PI(6) PI(12)

Second card--KODE = 9

1-2	5-7	8-12
+X	XXX	+XXXX
KODE	KUPDAT	NUM

131-character record--runoff.--

First card--KODE = 0. Note: The second line of variables refers to output corrected for pondage. The remaining variables are synonymous in both pondage and no-pondage computations.

1-5	6-8	9-11	12-14	15-22	23-28	29-38	39-48
+XXXX	+XX	+XX	+ XX	+XX.XXXX	+ XX.XX	+ XXXX.XXXX	+XXX.XXXXX
IWID	MONTH MONTHO	NDAY NDAYO	NYEAR	HR HRO	HT HTO	TI TIO	RATEO

49-59	60-69	70-79
±X.XXXXXXXX	+XXX.XXXXX	+XXX.XXXXX
PCORRO	RATE AJRATE	RRATE

Second card--KODE = 0

1-10	11-20	21-30	31-40	41	42-43	45-47	48-52
+XXX.XXXXX	+XXX.XXXXX	+XXX.XXXXX	+XXX.XXXXX	X	+X	XXX	+XXXX
RUNTI	ACDR	ACMR	ACYRR	NEST	KODE	KUPDAT	NUM

First card--KODE = 2

1-5
+XXXX
NRECD

Second card--KODE = 2

42-43	45-47	48-52
+X	XXX	+XXXX
KODE	KUPDAT	NUM

First card--KODE = 6. Note: The first line of variables refers to maximum volume, and the second line refers to peak discharge. The information in the second card is identical for both types of data.

1-5	6-8	9-11	12-14	15-22	23-31	32-37
+XXXX	+XX	+XX	+XX	+XX.XXXX	+XX.XXXXX	+XXXX.
IWID	MDATE(I)	NDATE(I)	NYEAR	TDAY(I)	AMAX(I)	HRS
IWID	MP	ND	NYEAR	TP	PEAK	

Second card--KODE = 6

42-43	45-47	48-52
+X	XXX	+XXXX
KODE	KUPDAT	NUM

First card--KODE = 7

1-5	6-8	9-11	12-14	70-79
+XXXX	+XX	+XX	+XX	+XXX.XXXXX
IWID	MONTH	NDAY	NYEAR	AVGDR

Second card--KODE = 7

11-20	31-40	42-43	45-47	48-52
+XXX.XXXXX	+XXX.XXXXX	+X	XXX	+XXXX
ACDR	ACYRR	KODE	KUPDAT	NUM

First card--KODE = 8

1-5	6-8	12-14	69-78
+XXXX	+XX	+XX	+XXXX.XXXX
IWID	MONTHO	NYEAR	PER(J)

Second card--KODE = 8

1-9	10-19	20-29	30-39	42-43	45-47	48-52
+XXX.XXXX	+XXXX.XXXX	+XXXX.XXXX	+XXXX.XXXX	+X	XXX	+XXXX
PER(J+1)	PER(J+2)	PER(J+3)	PER(J+4)	KODE	KUPDAT	NUM

Note: The first and second cards for KODE = 9 output are identical to KODE = 8.

132-character record--soil moisture.--

First card--

1-6	7-12	13-15	16-19	21-26	29-31	34-40	41-47
+XXXXX	+XXXXX	+XX	+XXX	XXXXXX	XXX	XXXXXXX	+XXXXX.
IWD	MO	ND	NYR	NSITE(I)	NTEBE(I)	NTEMP(I)	COUNTS(1)

48-54	55-61	62-68	69-75	76-80
+XXXXX.	+ XXXXX.	+XXXXX.	+XXXXX.	+XXXX
COUNTS(2)	COUNTS(3)	COUNTS(4)	COUNTS(5)	(First 5 digits of SUMC)

Second card--

1-4	5-13	14-24	25-36	45-47	48-52
XXX.	+XXXXXX.X	+XXXXXXX.XX	+XXXXXXXX.XX	XXX	+XXXX
Last 4 digits SUMC	AVG	PCSTD	PCMOIS	NUP	NCONT

Data Preparation

The data preparation and program execution are illustrated by the following example:

Precipitation data from several precipitation stations identified as P04 through P37, for the years 1962 and 1963, have been processed and the output placed on five separate tapes. The identification numbers (assigned by computer residence) for these tapes in the order in which they were processed are 7105, 7100, 6820, 5030, and 3200. Several errors were detected in the initial run. The stations containing errors were rerun and the data placed on tape 3250. A monthly total is to be corrected in station P12, tape 7100.

The data for 1962 and 1963 are to be rewritten on separate output tapes and the corrections contained on tape 3250 merged in their respective locations. Also, the correct monthly total for station P12, tape 7100, must be read from punchcards.

The station records on the respective tapes are:

Tape	Precipitation Stations
7105	P04, P05, ... , P09, P10 (1962).
7100	P12, P13, P14, P15, ... , P20 (1962).
6820	P21, P22, ... , P37 (1962), P04 (1963).
5030	P05, P06, ... , P20 (1963).
3200	P21, P22, ... , P37 (1963).
3250	P13, (1962) and P05, P37 (1963).

The steps for updating are as follows. Refer to table D1 for numerical values which illustrate the parameter card preparation for this example.

Tape 7105

There are no corrections in the data on tape 7105. Therefore, the problem is simply to rewrite this tape on the new output tape (S.SU00).

Prepare the parameter card as follows (table D1):

1. UPB1 and UPB2 will be the beginning update code and sequence number for station P04 (UPB1 = P04 and UPB2 = 1).

2. UPE1 and UPE2 will be the end update code and sequence number for station P10 (UPE1 = P10 and UPE2 = assume 760).

3. UPCODE, NUMBER, and INCR are left blank since the update code and sequence number on tape 7105 are to be transferred to the output tape.

4. NFL refers to the systems utility unit being used and will be defined when the order and number of parameter cards are known. Use utility unit 01 (S.SU01) for this example. See additional information following the discussion of tape 3200.

5. NFOR = 1 for precipitation data.

6. NEND = 8 because all data will have been transferred from this tape, and a new tape must be loaded.

7. NC left blank because all 1962 data must be written on the present output tape.

Tape 7100

The operations required for updating tape 7100 are one monthly correction in station P12, the replacement of P13 with P13 from tape 3250 and normal rewriting of the remaining data from 7100.

Five parameter cards are required to transfer correctly the data with corrections from 7100 to the output tape. If we assume that the monthly correction is for June 1962, these five parameter cards are:

1. Rewriting P12 up to the June monthly summary (KODE = 6 for precipitation).
2. Reading the corrected June summary from punchcards.
3. Rewriting the remainder of P12.
4. Replacing P13 with P13 from 3250.
5. Rewriting the remainder of tape 7100. See table D1 for the five cards.

Tape 6820

Tape 6820 contains data for both 1962 and 1963. No corrections or additions are required. Two parameter cards are required as follows:

1. Rewrite the remainder of 1962 data, rewind the output tape, dismount, and load a new output tape (NC = 7).
2. Rewrite P04.

Tape 5030

In tape 5030, P05 must be replaced by P05 from tape 3250. Two parameter cards are required to rewrite the entire tape.

1. Replace all data for station P05 recorded on tape 5030 with corrected P05 data stored on tape 3250, and change the update code (KUPDAT) P05 to P40 beginning with sequence No. 1 and increment by steps of two.
2. Rewrite the remainder of tape 5030.

Tape 3200

Station P37 must be replaced by P37 from tape 3250. Two parameter cards are required.

1. Rewrite tape 3200 to the beginning of the data for station P37.
2. Replace P37 data stored on tape 3200 with P37 data from tape 3250. This is the last parameter card so NEND = 9.

The next step is to code NFL and determine the order of the input tapes for S.SU01 and S.SU02. Note that the tape containing the corrected data is required throughout; consequently, this tape must always be either on S.SU01 or S.SU02. We will place it on S.SU02 since S.SU01 has previously been selected for mounting all tapes except the correction tape. Therefore, NFL = 2 for all parameter cards specifying input from tape 3250. The remaining parameter cards will be referenced to S.SU01; hence, NFL = 1.

The preparation of parameter cards for 80, 131, and 132 character records would be identical to the precipitation (90-character record) example.

A schematic illustration of the stacking order for the above example, using the IBM 7040 installation at Virginia Polytechnic Institute, Blacksburg, Va., is given in figure D1.

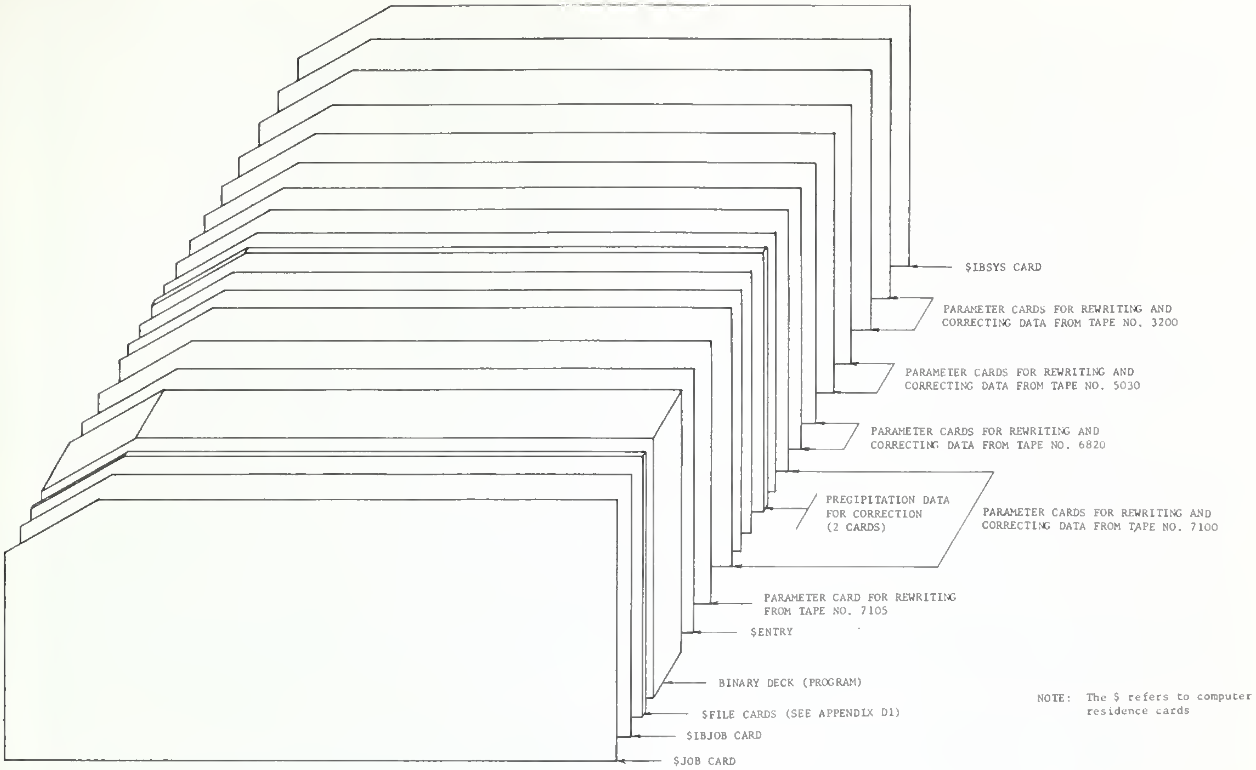

$IBSYS CARD
PARAMETER CARDS FOR REWRITING AND CORRECTING DATA FROM TAPE NO. 3200
PARAMETER CARDS FOR REWRITING AND CORRECTING DATA FROM TAPE NO. 5030
PARAMETER CARDS FOR REWRITING AND CORRECTING DATA FROM TAPE NO. 6820
PRECIPITATION DATA FOR CORRECTION (2 CARDS)
PARAMETER CARDS FOR REWRITING AND CORRECTING DATA FROM TAPE NO. 7100
PARAMETER CARD FOR REWRITING FROM TAPE NO. 7105
$ENTRY
BINARY DECK (PROGRAM)
$FILE CARDS (SEE APPENDIX D1)
$IBJOB CARD
$JOB CARD
NOTE: The $ refers to computer residence cards

Figure D1.--Schematic diagram illustrating the stacking order for the input data required by program D. The computer residence cards are those required by the IBM 7040/1401 installation at Virginia Polytechnic Institute, Blacksburg, Va.

PROGRAM E (PROGRAM FOR COMPILING ARS MISCELLANEOUS PUBLICATION INFORMATION)

Program E was designed to summarize the precipitation and runoff data resulting from data reduction programs A and B into a form compatible with the requirements of the U.S. Department of Agriculture Miscellaneous Publication "Hydrologic Data for Experimental Agricultural Watersheds in the United States." The four summaries are:

1. Selected storm event (antecedent conditions, rainfall, and runoff).
2. Mean daily discharge (CFS).
3. Daily precipitation.
4. Maximum-minimum temperature.

The program performs all required computations and summaries in one pass through the data. A detailed description of the source program and the corresponding Fortran variables are given in appendix lists E1 and E2, respectively. Details concerning the intercomponents and functions of the program follow.

Program Constants

Four areas are reserved for the storage of alphameric and numeric constants. These areas are NTYPE, NBLK, M, and NUMB. NTYPE and NBLK are alphameric constants, and M and NUMB are numeric constants. See appendix list E2 for symbol definitions. The constants are given in table E1.

TABLE E1.--Constants for program E

I	NTYPE	NBLK	NUMB	M
1 ----------	(1)	(1)	111	31
2 ----------	T	(1)	222	28; 29
3 ----------	E	(1)	122	31
4 ----------	S	(1)	112	30
5 ----------	L	(1)	212	31
6 ----------	H		221	30
7 ----------	N		121	31
8 ----------	M		211	31
9 ----------				30
10 ----------				31
11 ----------				30
12 ----------				31

[1] Blank storage areas (alphameric mode).

Input

The input data will consist of the following:

1. Parameter card.
2. Watershed area and conversion table.
3. Thiessen weights.
4. Average monthly precipitation and number of years of record.
5. Daily precipitation amounts in cards (if weekly gage has not been processed by program A).
6. Precipitation tape from program A.
7. Runoff tape from program B.
8. Average monthly maximum-minimum temperature.
9. Maximum-minimum temperature data cards.

Parameter Card

The parameter card contains the beginning and ending of the selected event, index, and identification coding. One card is required for each rain gage for which intensity values are required. The first card contains all coding necessary for successful execution of the program, and subsequent cards just require coding related to that gage. The card columns, format specification, and Fortran symbolic name for each data field follow:

First card.--

2-4	5-9	11-13	14-18	20-22	23-27	29-31
XXX	XXXXX	XXX	XXXXX	XXX	XXXXX	XXX
ANTA	ANTN	RBA	RBN	REA	REN	QANTA

32-36	38-40	41-45	47-49	50-54	55	56-57
XXXXX	XXX	XXXXX	XXX	XXXXX	X	XX
QANTN	QBA	QBN	QEA	QEN	CORT	RSTAS

58	59	60	61	62-65	66-67	68	69
X	X	X	X	XXXX	XX	X	X
NEND	NTEMP	NOP1	NOP2	IWIDIN	INGAGE	KRWDO	KRWD1

Subsequent cards.--

11-13	14-18	20-22	23-27	29-31	32-36	58	62-65	66-67
XXX	XXXXX	XXX	XXXXX	XXX	XXXXX	X	XXXX	XX
RBA	RBN	REA	REN	QANTA	QANTN	NEND	IWIDIN	INGAGE

In data fields 5-9, 14-18, 23-27, 32-36, 41-45, and 50-54, nonsignificant zeros are not punched. The data must always be right justified in their respective fields.

Watershed area and conversion table

The watershed area and conversion table consists of three cards containing information to convert inches per hour to cubic feet per second and cubic feet per second to inches for 15 watersheds. This table is normally loaded once during a given analysis; however, by proper coding of NOP1 in the parameter card, the table can be reloaded at the beginning of each watershed analysis. In either event, three cards must be loaded.

The last two digits of the watershed identification code must be identical to corresponding values for index I in the watershed area and conversion table; therefore, the last two digits of the watershed code must be greater than zero and equal to or less than 15. If less than 15 watersheds are to be processed, leave unused fields blank, for example, if watershed 06 is not being used, then card columns 6-10 and 51-56 of the second card will be left blank. When more than 15 watersheds are to be processed, increase the dimension of RA and AREA to the desired limits and correct the read loop so that the new number of conversion factors may be read.

The form of the watershed area and conversion table is illustrated below, preceded by the information contained in each card.

Card 1: Columns 1-50 contain RA values for watersheds 1-5.
Columns 51-80 contain AREA values for watersheds 1-5.
Card 2: Columns 1-50 contain RA values for watersheds 6-10.
Columns 51-80 contain AREA values for watersheds 6-10.
Card 3: Columns 1-50 contain RA values for watersheds 11-15.
Columns 51-80 contain AREA values for watersheds 11-15.

1-10	11-20	21-30	31-40	41-50
.XXXXXXXXXX	.XXXXXXXXXX	.XXXXXXXXXX	.XXXXXXXXXX	.XXXXXXXXXX
RA(I)	RA(I +1)	RA(I +2)	RA(I +3)	RA(I +4)

51-56	57-62	63-68	69-74	75-80
XXXX.XX	XXXX.XX	XXXX.XX	XXXX.XX	XXXX.XX
AREA(I)	AREA(I +1)	AREA(I +2)	AREA(I +3)	AREA(I+ 4)

Thiessen weights

The Thiessen weight card contains the weighted values that must be applied to each rain gage from a given watershed rain gage network to arrive at the average Thiessen weighted rainfall for that watershed. The program is dimensioned for a maximum rain gage network of six. A larger network may be obtained by increasing the dimension of TWTS.

The rain gage identification code must be $0 < IGAGE \leq 6$. The Thiessen weight for IGAGE = 1 would be stored at TWTS(I) where I = 1, IGAGE = 2 at TWTS(I +1) as shown in the following format.

1-3	4-6	7-9	10-12	13-15	16-18
X.XX	X.XX	X.XX	X.XX	X.XX	X.XX
TWTS(I)	TWTS(I +1)	TWTS(I+ 2)	TWTS(I +3)	TWTS(I +4)	TWTS(I+ 5)

Average Monthly Precipitation and Years of Record

Two cards contain the station average rainfall and years of record for each month from the previous year's computations. The first card contains the data for January through June, and the second card contains data for July through December. The format for both cards is identical. Decimals must be punched.

1-6	7-10	11-16	17-20	21-26	27-30
XXX.XX	XXX.	XXX.XX	XXX.	XXX.XX	XXX.
PYRSP(I)	YRSREC(I)	PYRSP(I+1)	YRSREC(I+1)	PYRSP(I+2)	YRSREC(I+2)

31-36	37-40	41-46	47-50	51-56	57-60
XXX.XX	XXX.	XXX.XX	XXX.	XXX.XX	XXX.
PYRSP(I+3)	YRSREC(I+3)	PYRSP(I+4)	YRSREC(I+4)	PYRSP(I+5)	YRSREC(I+5)

Daily Precipitation

The precipitation data required by this program will normally be on magnetic tape as a direct result of program A. Some data resulting from rain gage recordings with a 192-hour time scale may not be processed with program A because intensities for short durations cannot be accurately determined. Whenever these data are not processed by program A, the daily precipitation may be placed on punchcards and read from this source. Variable CORT specifies whether or not the precipitation data (R-1) is on punchcards or magnetic tape. All rain gages having a 192-hour time scale are classified as R-1 gages at the Blacksburg, Va., research station. The recording gages with faster time scales are classified as R-2, R-3, and so on, with the numeric digit being equivalent to IGAGE.

1-2	4-5	7-8	11-14	15	80
XX	XX	XX	XX.XX	X	X
MONTH	NDAY	NYEAR	DAC	LTYPRE	JEND

Precipitation

The precipitation input for program E is the data that is placed on magnetic tape for permanent storage by program A. This tape is placed on utility unit S.SU00. See program A for data format (storage tape).

Runoff

The runoff input for program E is the data that is placed on magnetic tape for permanent storage by program B. This tape is placed on utility unit S.SU01. See program B for data format (storage tape).

Average Monthly Maximum-Minimum Temperature

Two cards contain station average monthly maximum-minimum temperatures for the period of record from the previous year's computations. The second card also contains the number of years of record from which the average was computed. Decimals must be punched.

First card.--

1-6	7-12	13-18	19-24	25-30	31-36
XXXX.X	XXXX.X	XXXX.X	XXXX.X	XXXX.X	XXXX.X
AVMN(K)	AVMN(K)	AVMX(K+1)	AVMN(K+1)	AVMX(K+2)	AVMN(K+2)

37-42	43-48	49-54	55-60	61-66	67-72
XXXX.X	XXXX.X	XXXX.X	XXXX.X	XXXX.X	XXXX.X
AVMX(K+3)	AVMN(K+3)	AVMX(K+4)	AVMN(K+4)	AVMX(K+5)	AVMN(K+5)

Second card.--

1-6	7-12	13-18	19-24	25-30	31-36
XXXX.X	XXXX.X	XXXX.X	XXXX.X	XXXX.X	XXXX.X
AVMX(K+6)	AVMN(K+6)	AVMX(K+7)	AVMN(K+7)	AVMX(K+8)	AVMN(K+8)

37-42	43-48	49-54	55-60	61-66	67-72	77-80
XXXX.X	XXXX.X	XXXX.X	XXXX.X	XXXX.X	XXXX.X	XXX.
AVMX(K+9)	AVMN(K+9)	AVMX(K+10)	AVMN(K+10)	AVMX(K+11)	AVMN(K+11)	AK

Maximum-Minimum Temperature

The cards containing the daily maximum and minimum temperatures represent the last input for a given watershed. MONTH and NDAY serve as indexes for both storage matrices.

1-2	3-4	6-8	10-12	80
XX	XX	XXX	XXX	X
MONTH	NDAY	NTMAX(MONTH,NDAY)	NTMIN(MONTH,NDAY)	NEND

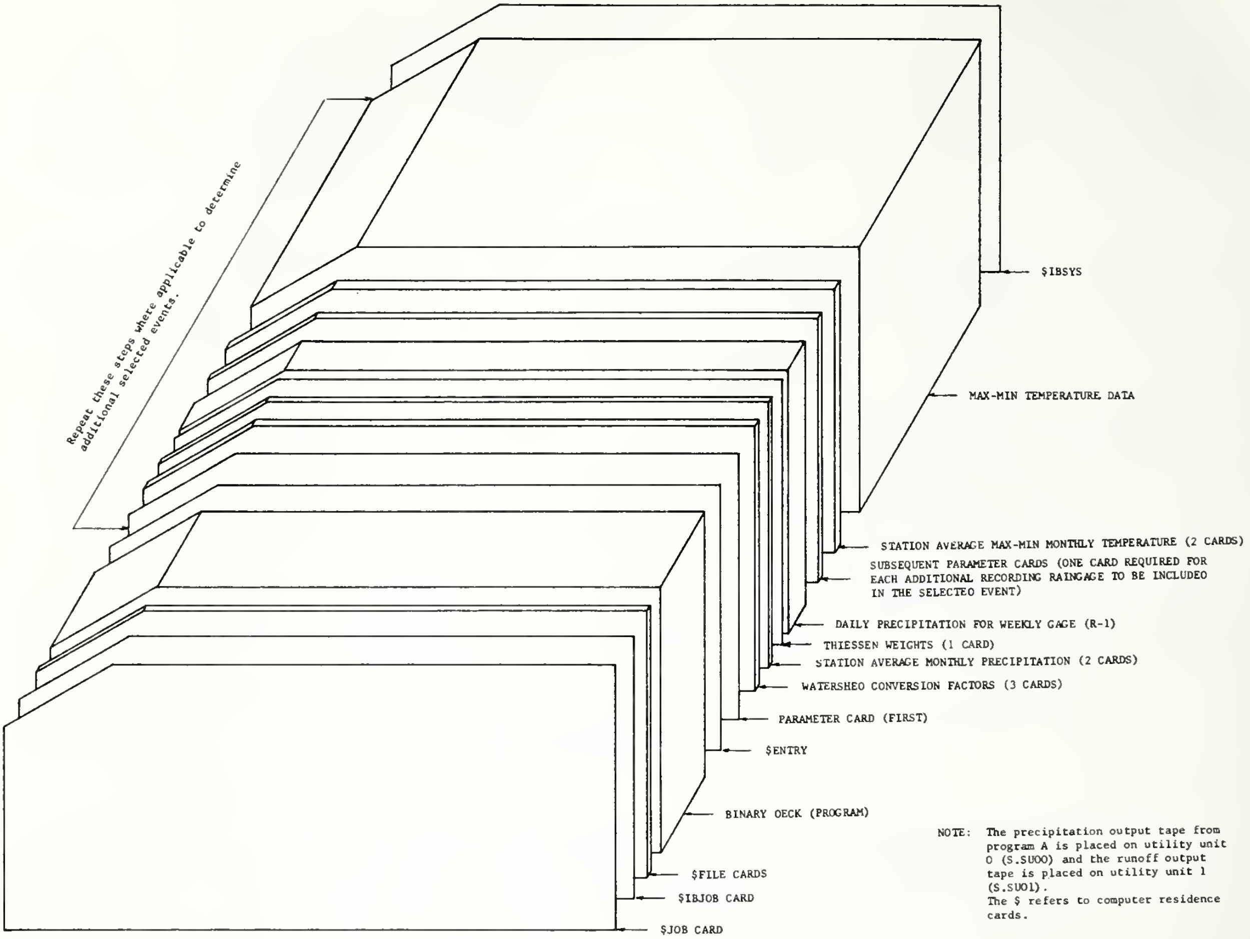
Order of Input

The location of rain gages within a given watershed determines the Thiessen weight for any given gage. Occasionally rain gages must be relocated for some reason; consequently, the Thiessen weights of all rain gages will change. Program E has been modified so that it will process one Thiessen weight change per watershed per year. The stacking order for no Thiessen weight change and one Thiessen weight change is given below. The stacking order required by the IBM 7040/1401 installation at Virginia Polytechnic Institute, Blacksburg, Va., is further illustrated by figure E1.

No Thiessen Weight Change

The input cards for the routine of no Thiessen weight change must be stacked in the following order:

1. Cards specified by the computer residence.
2. Binary deck (computer program instructions).
3. First parameter card.
4. Watershed area and rate conversion factors (three cards).
5. Station average monthly precipitation and number of years of record from previous year's computation (two cards).
6. Thiessen weights (one card).
7. R-1 daily precipitation data when on punchcards (omit this step if R-1 data are on magnetic tape).
8. Subsequent parameter cards as required.
9. Station average monthly maximum-minimum temperature and years of record from previous year's computations (two cards).
10. Maximum-minimum temperature data.
11. For additional watersheds, repeat steps 3-10 where applicable. Step 4 will normally be omitted because all watershed areas and rate conversion factors that will be required for a given computer run will usually be loaded with the first group of watershed data.


Repeat these steps where applicable to determine additional selected events.
$IBSYS
MAX-MIN TEMPERATURE DATA
STATION AVERAGE MAX-MIN MONTHLY TEMPERATURE (2 CARDS)
SUBSEQUENT PARAMETER CARDS (ONE CARD REQUIRED FOR EACH ADDITIONAL RECORDING RAINGAGE TO BE INCLUDEO IN THE SELECTEO EVENT)
DAILY PRECIPITATION FOR WEEKLY GAGE (R-1)
THIESSEN WEIGHTS (1 CARD)
STATION AVERAGE MONTHLY PRECIPITATION (2 CARDS)
WATERSHEO CONVERSION FACTORS (3 CARDS)
PARAMETER CARD (FIRST)
$ENTRY
BINARY OECK (PROGRAM)
$FILE CARDS
$IBJOB CARD
$JOB CARD

NOTE: The precipitation output tape from program A is placed on utility unit 0 (S.SUOO) and the runoff output tape is placed on utility unit 1 (S.SUO1).
The $ refers to computer residence cards.

Figure E1.--Schematic diagram illustrating the stacking order for the input data required by program E. The computer residence cards are those required by the IBM 7040/1401 installation at Virginia Polytechnic Institute, Blacksburg, Va.

One Thiessen Weight Change

The input cards for the routine of one Thiessen weight change must be stacked in the following order:

1. Cards specified by the computer residence.
2. Binary deck (computer program instructions).
3. First parameter card.
4. Watershed area and rate conversion factors (three cards).
5. Station average monthly precipitation and number years record from previous year's computations (two cards).
6. Old Thiessen weights (one card).
7. R-1 daily precipitation data for the period prior to rain gage relocation.
8. The first card of the remaining R-1 data (an 8 must be punched in column 80).
9. New Thiessen weights (one card).
10. The remainder of the R-1 data.
11. Old Thiessen weights (one card).
12. New Thiessen weights (one card).
13. Subsequent parameter card.
14. Old Thiessen weight (one card).

15. New Thiessen weight (one card).

16. Repeat steps 13-15 for each additional rain gage to be processed.

17. Station average monthly maximum-minimum temperature and the number of years of record from the previous year's computations (two cards).

18. Maximum-minimum temperature data.

19. Repeat steps 3-18 where applicable for additional watersheds.

Data Preparation

Two general steps are required in preparing the input data for program E. (1) Storm events for all watersheds are selected manually from the output of programs A and B using as a guide the criteria set forth in the references listed in footnotes 3 and 4 on page 1 and, (2) after suitable events have been selected, parameter cards are prepared for each selected event. Table E2 is given as a guide for preparing these data cards.

The procedures to be followed in selecting storm events are covered reasonably well in the references listed in footnotes 3 and 4 on page 1 and will not be discussed in this report.

The storm event shown in figures A1 and B1 in conjunction with the output from programs A and B for this event (tables A5 and B5) will be used to illustrate the procedure to be followed in preparing the parameter cards. The steps to be followed are given below in the order that the data must be punched in the parameter card.

1. Columns 2-9 contain the information that will be required to locate the beginning of antecedent precipitation or the point at which Thiessen weights must be changed. The latter information is required when Thiessen weighted daily precipitation data are summarized for the R-1 rain gage. Both sets of information will never be required at the same time. Antecedent conditions for periods greater than 1 day are determined for unit-source areas; however, Thiessen weighted precipitation is not summarized under these conditions. Completed parameter cards are given in table E2. The first card was prepared for a unit-source watershed where antecedent conditions were required for 30 days prior to the beginning of the selected rainfall event. The second card was prepared for a complex watershed, where antecedent conditions were required only for the day that rainfall began. Mean daily discharge, Thiessen weighted daily precipitation, and maximum-minimum temperature summaries were also required for the complex area. The rain gages were not relocated during the year; therefore, columns 2-9 remain blank in the second parameter card.

Special Note: All sequence numbers used in steps 1 through 4 must be right justified and punched exactly as stored on tape and as shown in example tables A5 and B5.

2. Columns 11-27 contain the information that will be required to locate the beginning and ending of the selected event. Note that only code 0 data may be used in selecting the update code and sequence number to be placed in columns 11-27.

3. Columns 29-36 contain the information that will be required to locate the beginning of antecedent runoff or the point at which Thiessen weights must be changed. The latter information is required when Thiessen weighted precipitation data are summarized for the R-2 rain gage. For the example in table E2, the first card contains the update and sequence number for the beginning of 30-day antecedent runoff (table B5). Since there were no Thiessen weight changes during the year (step 1), columns 29-36 remain blank in the second parameter card.

4. Columns 38-54 contain the information that will be necessary to locate the beginning and ending of the selected runoff event. Note that only code 0 data may be used in selecting the update and sequence number to be placed in columns 38-54. See table B5 for verification of the values placed in columns 38-54 for the example in table E2.

5. Column 55 specifies the location of the R-1 data. CORT = 1 if R-1 data are on punchcards and CORT = 2 if R-1 data are on magnetic tape. This column is ignored when antecedent conditions are determined for periods greater than 1 day (first card of table E2). In this example the R-1 data are on magnetic tape.

TABLE E2. -- Code sheet for recording parameter card data for publication summaries (input for program E)

Date 7-13-66

Sheet 1 of 1

ANTA 2-4	ANTN 5-9	RBA 11-13	RBN 14-18	REA 20-22	REN 23-27	QANTA 29-31	QANTN 32-36	QBA 38-40	QBN 41-45	QEA 47-49	QEN 50-54	CORT 55	RSTAS 56-57	NEND 58	NTEMP 59	NOP1 60	NOP2 61	IWIDIN 62-65	INGAGE 66-67	KRWDO 68	KRWDI 69
P29	553	P29	620	P29	642	Q12	1344	Q12	1454	Q12	1483					2	1				
		P29	620	P29	642			Q12	1454	Q12	1483	2	01	9	1	1	2	1312	02	1	1

Tabulated by______

Checked by______

6. Columns 56-57 contain the total number of rain gages that are to be used in the selected event summary, exclusive of R-1 gages. These columns are always blank when antecedent conditions are determined (first card table E2). For this example only one rain gage is used in the selected event summary.

7. Column 58 contains a code to stop data processing. The last parameter card to be processed contains a 9 in column 58. This column in all previous cards is left blank.

8. Column 59 specifies if maximum-minimum temperature data will be summarized. Maximum-minimum temperature data cannot be summarized when antecedent conditions are determined; therefore, this column always remains blank in those situations (first card, table E2). A 1 is placed in column 59 when maximum-minimum temperature data must be summarized.

9. Column 60 contains a code which specifies if the watershed area and conversion factor table must be read. Normally, this table is read only once.

10. Column 61 contains a code which specifies if Thiessen weights must be read. Thiessen weights are never required when antecedent conditions are determined. In those situations, column 61 will always contain a 1 (see example, first card, table E2).

11. Columns 62-65 contain the watershed identification code for the watershed being processed. These columns remain blank when antecedent conditions are determined.

12. Columns 66-67 contain the rain gage identification code for the rain gage being processed. These columns also remain blank when antecedent conditions are determined.

13. Data are stored on magnetic tape in sequential order. When a given block of data has been passed during processing, normally the only way to again gain access to this data is to rewind the tape and start at the beginning. Columns 60 and 61 have been provided for this purpose. If the data required by the parameter card has been passed over, then the precipitation tape will be rewound if a 1 is placed in column 60, and the runoff tape will be rewound if a 1 is placed in column 61.

Output

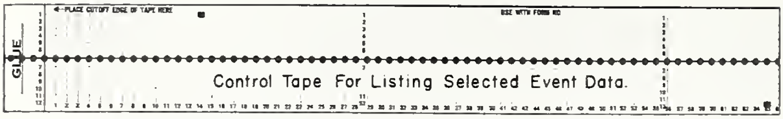
All output from program E is placed on standard 80-column punchcards and coded so that when listed by an IBM 407 tabulating machine they will be in a form acceptable for the U.S. Department of Agriculture Miscellaneous Publication, "Hydrologic Data for Agricultural Watersheds in the United States." Two IBM 407 board wirings are required. Figure E2 illustrates the wiring diagram for selected event data, and figure E3 illustrates the diagram for Thiessen weighted daily precipitation, mean daily discharge (CFS), and maximum-minimum temperature summaries.

The order of output for each watershed is as follows:

1. Selected storm event.
2. Mean daily discharge (CFS).
3. Thiessen weighted daily precipitation.
4. Current station average monthly precipitation and year's record (two cards).
5. Maximum-minimum temperature.
6. Current station average monthly maximum-minimum temperature summary (two cards).

Selected Storm Event

The card for the selected storm event data contains information on antecedent conditions, rainfall, and runoff. The time of day has been increased by 10,000 so that four positions in the time field will always be punched, regardless of whether the answers contain one or four significant digits. For example 40 minutes will appear as 10040 on the punchcard and as 0040 in the final tabulation when the board wiring of figure E2 is used.


GLUE
PLACE CUTOFF EDGE OF TAPE HERE
Control Tape For Listing Selected Event Data.

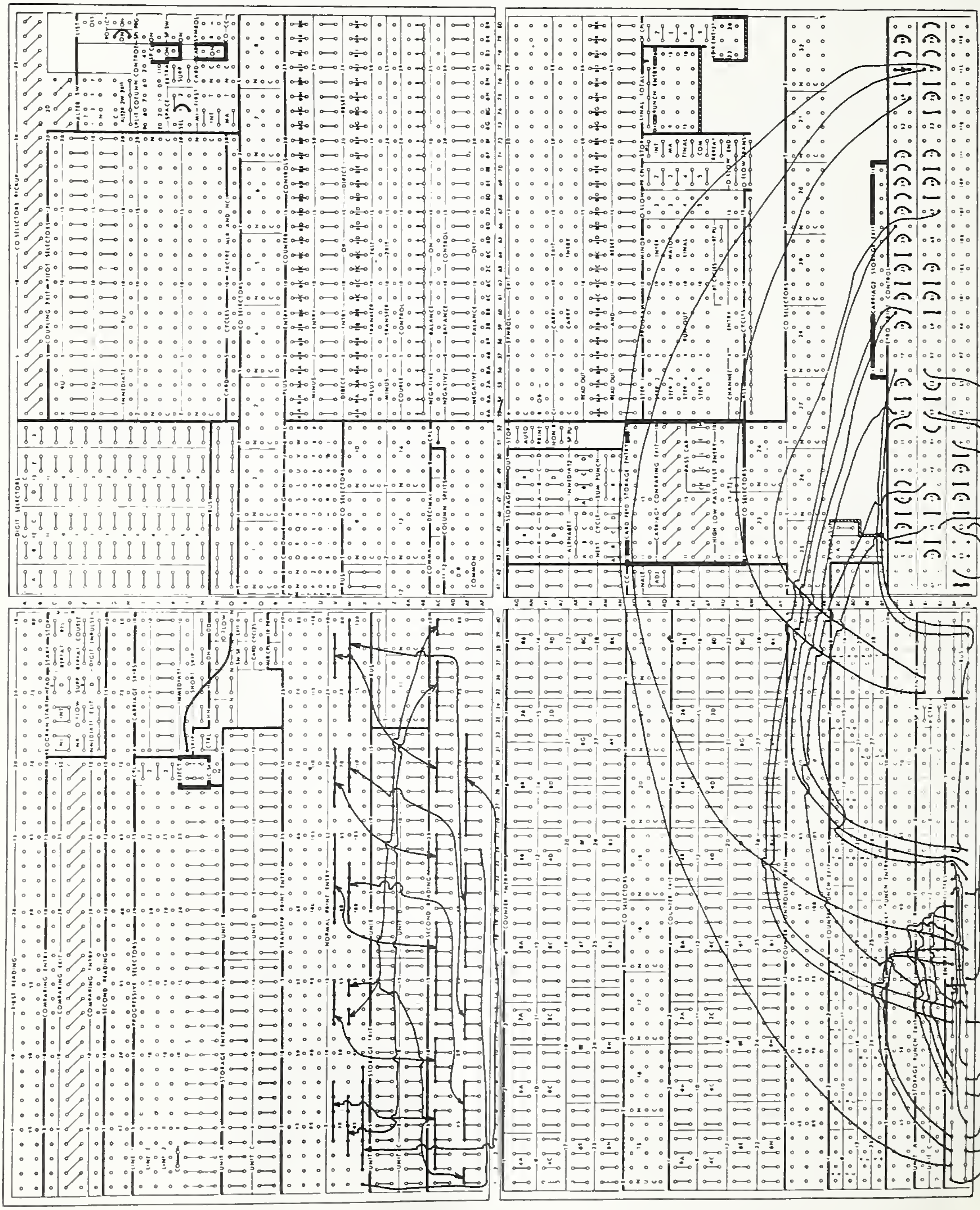
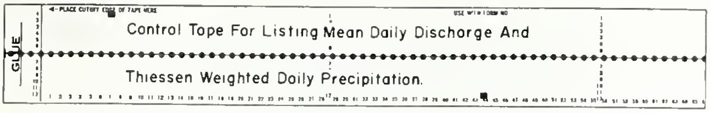
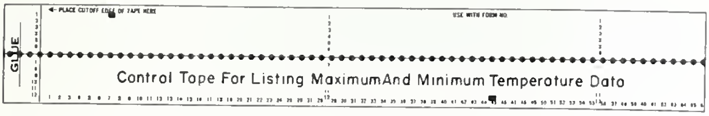


Figure E2.--IBM 407 board wiring diagram to be used for listing selected event data.


PLACE CUTOFF EDGE OF TAPE HERE
USE WITH FORM NO.
GLUE
Control Tape For Listing Mean Daily Discharge And
Thiessen Weighted Daily Precipitation.


PLACE CUTOFF EDGE OF TAPE HERE
USE WITH FORM NO.
GLUE
Control Tape For Listing Maximum And Minimum Temperature Data

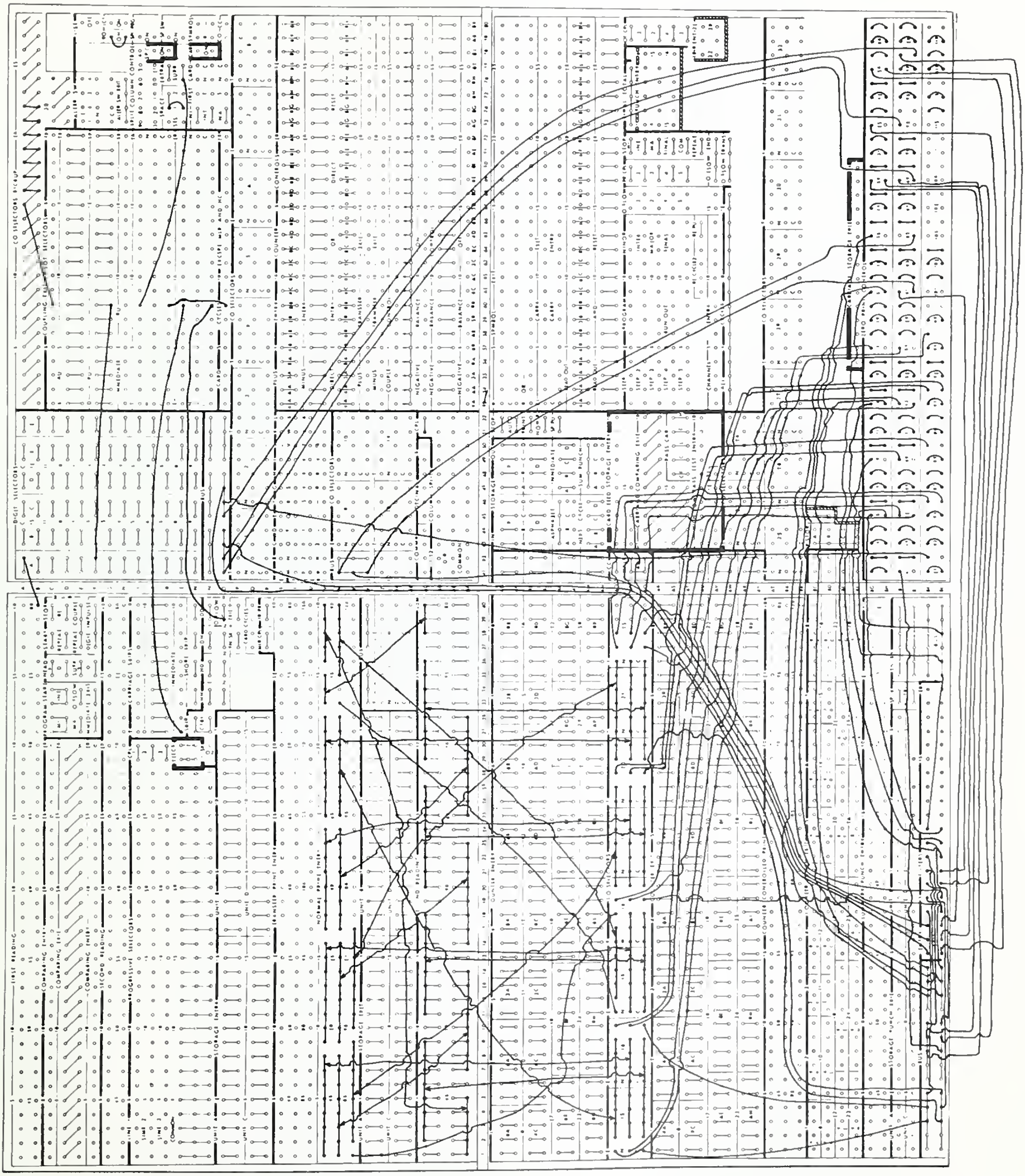


Figure E3.--IBM 407 board wiring diagram to be used for listing mean daily discharge, Thiessen weighted daily precipitation, and maximum-minimum temperature data.

TABLE E3. -- 1965 SELECTED STORM EVENT FROM PONY MOUNTAIN BRANCH WATERSHED SHOWING AN EXAMPLE OF 30-DAY ANTECEDENT CONDITIONS

YEAR	SWC FORM 63 AUG 1963	USDA-ARS	LOCATION (Town, state)	WATERSHED NUMBER (in/hr)	CODE NO.
1965	SELECTED RUNOFF EVENTS		BLACKSBURG, VIRGINIA	PONY MOUNTAIN BRANCH W-I	13.12

ANTECEDENT CONDITIONS			RAINFALL				RUNOFF			
DATE MO-DAY	RAINFALL (inches)	RUNOFF (inches)	DATE MO-DAY	TIME OF DAY	INTENSITY (in hr)	ACC. (inches)	DATE MO-DAY	TIME OF DAY	RATE (c/s)	ACC. (inches)
				Event of September 24, 1965						
	RG R-2			RG	R-2					
8-25	.96	.0346	9-24	1345	.00	.00	9-24	1404	.0009	.0000
8-26	.09	T		1349	1.05	.07		1406	.0024	.0001
9-11	.93	.0060		1351	3.30	.18		1408	.0044	.0002
9-12	.61	.0024		1355	1.05	.25		1410	.0084	.0004
9-13	.19	.0008		1359	1.50	.35		1412	.0141	.0008
9-16	.15	.0000		1405	.00	.35		1414	.0207	.0013
9-24	.16	.0065		1406	9.00	.50		1416	.0274	.0021
				1411	1.56	.63		1418	.0336	.0032
				1413	3.60	.75		1420	.0414	.0044
				1416	1.40	.82		1422	.0484	.0059
				1419	2.20	.93		1424	.0506	.0076
				1512	.01	.94		1427	.0498	.0101
				1524	.15	.97		1432	.0419	.0139
				1544	.09	1.00		1436	.0357	.0165
				1555	.05	1.01		1442	.0267	.0196
				1630	.02	1.02		1449	.0177	.0222
				1642	.15	1.05		1500	.0110	.0248
				1657	.04	1.06		1510	.0070	.0263
				1728	.02	1.07		1524	.0040	.0276
				1805	.06	1.11		1540	.0025	.0285
				1850	.05	1.15		1600	.0015	.0291
								1636	.0006	.0297
								1720	.0003	.0301
								1800	.0002	.0302
								1912	.0001	.0304
								2036	.0001	.0306
								2212	.0000	.0307
								2400	.0000	.0307
							9-25	0200	.0000	.0307

TABLE E4. -- 1965 SELECTED STORM EVENT FROM PONY MOUNTAIN BRANCH WATERSHED SHOWING AN EXAMPLE OF 1-DAY ANTECEDENT CONDITIONS

YEAR	SWC FORM 63 AUG 1963	USDA-ARS	LOCATION (Town, state)	WATERSHED NUMBER (in/hr)	CODE NO.
1965	SELECTED RUNOFF EVENTS		BLACKSBURG, VIRGINIA	PONY MOUNTAIN BRANCH W-I	13.12

ANTECEDENT CONDITIONS			RAINFALL				RUNOFF			
DATE MO-DAY	RAINFALL (inches)	RUNOFF (inches)	DATE MO-DAY	TIME OF DAY	INTENSITY (in hr)	ACC. (inches)	DATE MO-DAY	TIME OF DAY	RATE (c/s)	ACC. (inches)
				Event of September 24, 1965						
	RG R-2			RG	R-2					
9-24	.16	.0065	9-24	1345	.00	.00	9-24	1404	.1798	.0000
				1349	1.05	.07		1406	.4661	.0001
				1351	3.30	.18		1408	.8451	.0002
				1355	1.05	.25		1410	1.6341	.0004
				1359	1.50	.35		1412	2.7267	.0008
				1405	.00	.35		1414	4.0108	.0013
				1406	9.00	.50		1416	5.3084	.0021
				1411	1.56	.63		1418	6.4996	.0032
				1413	3.60	.75		1420	8.0042	.0044
				1416	1.40	.82		1422	9.3637	.0059
				1419	2.20	.93		1424	9.7775	.0076
				1512	.01	.94		1427	9.6344	.0101
				1524	.15	.97		1432	8.1009	.0139
				1544	.09	1.00		1436	6.9116	.0165
				1555	.05	1.01		1442	5.1556	.0196
				1630	.02	1.02		1449	3.4248	.0222
				1642	.15	1.05		1500	2.1253	.0248
				1657	.04	1.06		1510	1.3440	.0263
				1728	.02	1.07		1524	.7793	.0276
				1805	.06	1.11		1540	.4757	.0285
				1850	.05	1.15		1600	.2901	.0291
								1636	.1160	.0297
								1720	.0599	.0301
								1800	.0387	.0302
								1912	.0232	.0304
								2036	.0135	.0306
								2212	.0058	.0307
								2400	.0039	.0307
							9-25	0200	.0000	.0307

Punchcard form.--

Antecedent Conditions						Rainfall		
1-3	4-6	7-11	12-18	19	20-25	26-31	32-37	38-42
+XX	-XX	+X.XX	+X.XXXX	X	+XX-XX	+XXXXX	+ XX.XX	+X.XX
MATC(I, J)					MODT	LTIMEP	NAI	NSUM

Runoff						
43-45	46-48	49-54	55-64	65-71	72	73-80
+ XX	-XX	+ XXXXX	+XXXX.XXXX	+ X.XXXX	X	+ XXXXXXX
MONQ	NQD	LTIMEQ	AJRATE	SUMQ	(See note)	MM

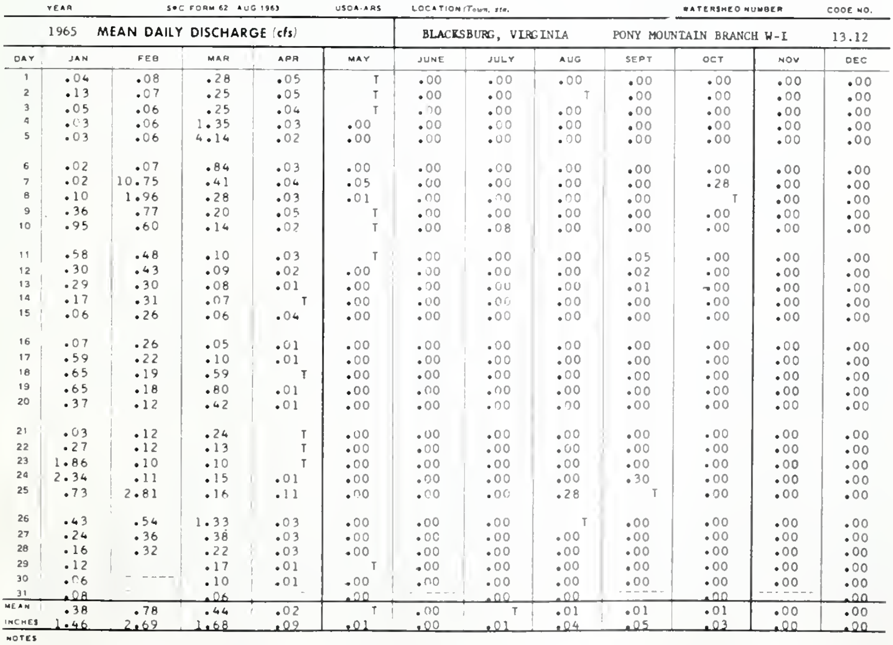
Note: Column 72 contains a T when $0.00000 < SUMQ < 0.00005$ and is left blank when $0.00000 = SUMQ \geq 0.00005$.

Antecedent conditions are summarized for 30 days prior to the beginning of the selected event, except when Thiessen weighted daily rainfall is determined. The rainfall-runoff occurring antecedent to and within the same day that the selected event occurs are determined when 30-day antecedent conditions are not required. Tables E3 and E4 contain example listings of the data for the same selected storm event, which illustrates 30-day antecedent conditions and daily antecedent conditions, respectively. Note that the programming logic will not allow 30-day antecedent summaries when Thiessen weighted daily rainfall and mean daily discharge data summaries are being made. The selected event is the only summary that will be obtained with 30-day antecedent conditions.

Mean Daily Discharge

The mean daily discharge is summarized and placed in tabular form by days and months. The output list for each day is placed on two data cards which will result in one line of print (table E5) when listed by the IBM 407 tabulator with the wiring diagram shown in figure E3.

TABLE E5. -- 1965 MEAN DAILY DISCHARGE FOR PONY MOUNTAIN BRANCH WATERSHED



YEAR	S•C FORM 62 AUG 1963	USDA-ARS	LOCATION (Town, ste.	WATERSHED NUMBER	CODE NO.
1965	MEAN DAILY DISCHARGE (cfs)		BLACKSBURG, VIRGINIA	PONY MOUNTAIN BRANCH W-I	13.12

DAY	JAN	FEB	MAR	APR	MAY	JUNE	JULY	AUG	SEPT	OCT	NOV	DEC
1	.04	.08	.28	.05	T	.00	.00	.00	.00	.00	.00	.00
2	.13	.07	.25	.05	T	.00	.00	T	.00	.00	.00	.00
3	.05	.06	.25	.04	T	.00	.00	.00	.00	.00	.00	.00
4	.03	.06	1.35	.03	.00	.00	.00	.00	.00	.00	.00	.00
5	.03	.06	4.14	.02	.00	.00	.00	.00	.00	.00	.00	.00
6	.02	.07	.84	.03	.00	.00	.00	.00	.00	.00	.00	.00
7	.02	10.75	.41	.04	.05	.00	.00	.00	.00	.28	.00	.00
8	.10	1.96	.28	.03	.01	.00	.00	.00	.00	T	.00	.00
9	.36	.77	.20	.05	T	.00	.00	.00	.00	.00	.00	.00
10	.95	.60	.14	.02	T	.00	.08	.00	.00	.00	.00	.00
11	.58	.48	.10	.03	T	.00	.00	.00	.05	.00	.00	.00
12	.30	.43	.09	.02	.00	.00	.00	.00	.02	.00	.00	.00
13	.29	.30	.08	.01	.00	.00	.00	.00	.01	.00	.00	.00
14	.17	.31	.07	T	.00	.00	.00	.00	.00	.00	.00	.00
15	.06	.26	.06	.04	.00	.00	.00	.00	.00	.00	.00	.00
16	.07	.26	.05	.01	.00	.00	.00	.00	.00	.00	.00	.00
17	.59	.22	.10	.01	.00	.00	.00	.00	.00	.00	.00	.00
18	.65	.19	.59	T	.00	.00	.00	.00	.00	.00	.00	.00
19	.65	.18	.80	.01	.00	.00	.00	.00	.00	.00	.00	.00
20	.37	.12	.42	.01	.00	.00	.00	.00	.00	.00	.00	.00
21	.03	.12	.24	T	.00	.00	.00	.00	.00	.00	.00	.00
22	.27	.12	.13	T	.00	.00	.00	.00	.00	.00	.00	.00
23	1.86	.10	.10	T	.00	.00	.00	.00	.00	.00	.00	.00
24	2.34	.11	.15	.01	.00	.00	.00	.00	.30	.00	.00	.00
25	.73	2.81	.16	.11	.00	.00	.00	.28	T	.00	.00	.00
26	.43	.54	1.33	.03	.00	.00	.00	T	.00	.00	.00	.00
27	.24	.36	.38	.03	.00	.00	.00	.00	.00	.00	.00	.00
28	.16	.32	.22	.03	.00	.00	.00	.00	.00	.00	.00	.00
29	.12		.17	.01	T	.00	.00	.00	.00	.00	.00	.00
30	.06		.10	.01	.00	.00	.00	.00	.00	.00	.00	.00
31	.08		.06		.00		.00	.00		.00		.00
MEAN	.38	.78	.44	.02	T	.00	T	.01	.01	.01	.00	.00
INCHES	1.46	2.69	1.68	.09	.01	.00	.01	.04	.05	.03	.00	.00

NOTES

The punchcard format is illustrated below.

First card.--

1-9	10-18	19-27	28-36	37-45	46-54
+XXXX.XXX	+XXXX.XXX	+XXXX.XXX	+XXXX.XXX	+XXXX.XXX	+XXXX.XXX
NT(I, II)	NT(I, II +1)	NT(I, II +2)	NT(I, II +3)	NT(I, II +4)	NT(I, II +5)

55-63	64-72	73-77	80
+XXXX.XXX	+XXXX.XXX	+XXXX	X
NT(I, II +6)	NT(I, II+ 7)	NUM	(See note)

Second card.--

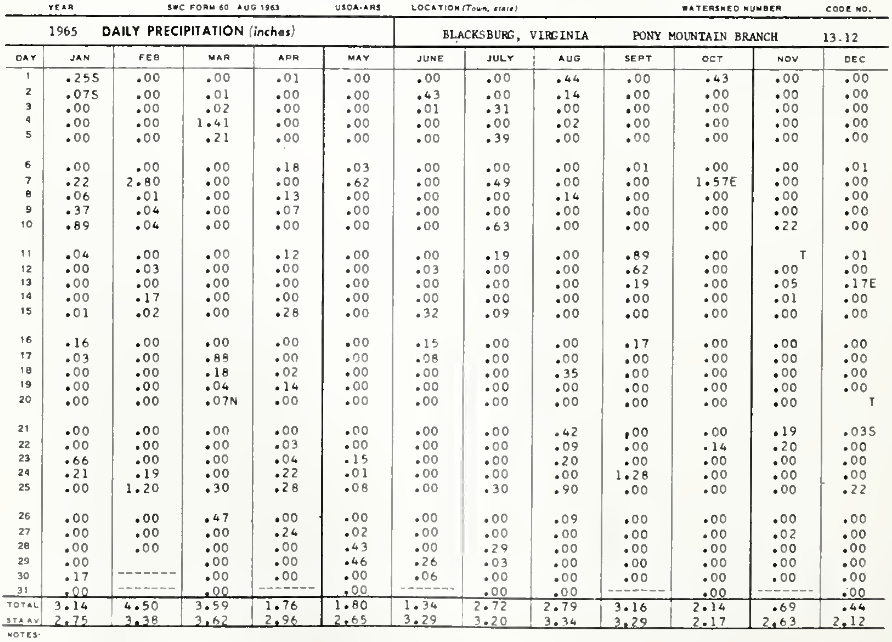
1-9	10-18	19-27	28-36	73-77	80
+XXXX.XXX	+XXXX.XXX	+XXXX.XXX	+XXXX.XXX	+XXXX	X
NT(I, II +8)	NT(I, II+ 9)	NT(I, II +10)	NT(I, II+ 11)	NUM1	(See note)

Note: Column 80 of cards 1 and 2 always contains a 1 and 2, respectively. Card columns 9, 18, 27, 36, 45, 54, 63, and 72 of card 1 and columns 9, 18, 27, and 36 of card 2 will contain a T when $0.000 \leq NT(I,II) < 0.005$; otherwise, the columns will be blank where I represents days and II represents months.

Thiessen Weighted Daily Precipitation

The punchcard format for Thiessen weighted daily rainfall is identical to the punchcard format for mean daily discharge. The wiring diagram illustrated in figure E3 is used to list the data. An example listing is depicted in table E6.

TABLE E6. -- 1965 THIESSEN WEIGHTED DAILY PRECIPITATION FOR PONY MOUNTAIN BRANCH WATERSHED



YEAR SWC FORM 60 AUG 1963 USDA-ARS LOCATION (Town, state) WATERSHED NUMBER CODE NO.

1965 **DAILY PRECIPITATION** *(inches)* BLACKSBURG, VIRGINIA PONY MOUNTAIN BRANCH 13.12

DAY	JAN	FEB	MAR	APR	MAY	JUNE	JULY	AUG	SEPT	OCT	NOV	DEC
1	.25S	.00	.00	.01	.00	.00	.00	.44	.00	.43	.00	.00
2	.07S	.00	.01	.00	.00	.43	.00	.14	.00	.00	.00	.00
3	.00	.00	.02	.00	.00	.01	.31	.00	.00	.00	.00	.00
4	.00	.00	1.41	.00	.00	.00	.00	.02	.00	.00	.00	.00
5	.00	.00	.21	.00	.00	.00	.39	.00	.00	.00	.00	.00
6	.00	.00	.00	.18	.03	.00	.00	.00	.01	.00	.00	.01
7	.22	2.80	.00	.00	.62	.00	.49	.00	.00	1.57E	.00	.00
8	.06	.01	.00	.13	.00	.00	.00	.14	.00	.00	.00	.00
9	.37	.04	.00	.07	.00	.00	.00	.00	.00	.00	.00	.00
10	.89	.04	.00	.00	.00	.00	.63	.00	.00	.00	.22	.00
11	.04	.00	.00	.12	.00	.00	.19	.00	.89	.00	T	.01
12	.00	.03	.00	.00	.00	.03	.00	.00	.62	.00	.00	.00
13	.00	.00	.00	.00	.00	.00	.00	.00	.19	.00	.05	.17E
14	.00	.17	.00	.00	.00	.00	.00	.00	.00	.00	.01	.00
15	.01	.02	.00	.28	.00	.32	.09	.00	.00	.00	.00	.00
16	.16	.00	.00	.00	.00	.15	.00	.00	.17	.00	.00	.00
17	.03	.00	.88	.00	.00	.08	.00	.00	.00	.00	.00	.00
18	.00	.00	.18	.02	.00	.00	.00	.35	.00	.00	.00	.00
19	.00	.00	.04	.14	.00	.00	.00	.00	.00	.00	.00	.00
20	.00	.00	.07N	.00	.00	.00	.00	.00	.00	.00	.00	T
21	.00	.00	.00	.00	.00	.00	.00	.42	.00	.00	.19	.03S
22	.00	.00	.00	.03	.00	.00	.00	.09	.00	.14	.20	.00
23	.66	.00	.00	.04	.15	.00	.00	.20	.00	.00	.00	.00
24	.21	.19	.00	.22	.01	.00	.00	.00	1.28	.00	.00	.00
25	.00	1.20	.30	.28	.08	.00	.30	.90	.00	.00	.00	.22
26	.00	.00	.47	.00	.00	.00	.00	.09	.00	.00	.00	.00
27	.00	.00	.00	.24	.02	.00	.00	.00	.00	.00	.02	.00
28	.00	.00	.00	.00	.43	.00	.29	.00	.00	.00	.00	.00
29	.00		.00	.00	.46	.26	.03	.00	.00	.00	.00	.00
30	.17	-------	.00	.00	.00	.06	.00	.00	.00	.00	.00	.00
31	.00	-------	.00	-------	.00	-------	.00	.00	-------	.00	-------	.00
TOTAL	3.14	4.50	3.59	1.76	1.80	1.34	2.72	2.79	3.16	2.14	.69	.44
STA AV	2.75	3.38	3.62	2.96	2.65	3.29	3.20	3.34	3.29	2.17	2.63	2.12

NOTES:

Average Monthly Precipitation and Number of Years of Record

The average monthly precipitation for the station record is determined and punched on two cards. The first card contains the values for January through June, and the second card contains data for July through December. These cards must be saved for the succeeding year's analysis because they become the station average monthly precipitation described on page 56.

Maximum-Minimum Temperature

The maximum-minimum monthly temperature utilizes the same data fields that are used for mean daily discharge and Thiessen weighted precipitation; consequently, the same board wiring (fig. E3) may be used.

An illustrative example of the maximum-minimum temperature listing is given in table E7. The punchcard format from which the listing in table E7 was made is shown below.

First card.--

1-4	5-8	10-13	14-17	19-22
±XXX	±XXX	±XXX	±XXX	±XXX
NTMAX(I, J)	NTMIN(I, J)	NTMAX(I+1, J)	NTMIN(I+1, J)	NTMAX(I+2, J)

23-26	28-31	32-35	37-40	41-44
±XXX	±XXX	±XXX	±XXX	±XXX
NTMIN(I+2, J)	NTMAX(I+3, J)	NTMIN(I+3, J)	NTMAX(I+4, J)	NTMIN(I+4, J)

46-49	50-53	55-58	59-62	64-67
±XXX	±XXX	±XXX	±XXX	±XXX
NTMAX(I+5, J)	NTMIN(I+5, J)	NTMAX(I+6, J)	NTMIN(I+6, J)	NTMAX(I+7, J)

68-71	73-77	80
±XXX	+XXXX	X
NTMIN(I+7, J)	NUM1	(See note)

Second card.--

1-4	5-8	10-13	14-17	19-22
±XXX	±XXX	±XXX	±XXX	±XXX
NTMAX(I+8, J)	NTMIN(I+8, J)	NTMAX(I+9, J)	NTMIN(I+9, J)	NTMAX(I+10, J)

23-26	28-31	32-35	73-77	80
+XXX	±XXX	±XXX	+XXXX	X
NTMIN(I+10, J)	NTMAX(I+11, J)	NTMIN(I+11, J)	NUM2	(See note)

Note: Column 80 of cards 1 and 2 always contain a 1 and 2, respectively.

TABLE E7. -- 1965 DAILY MAXIMUM - MINIMUM TEMPERATURE SUMMARY FOR CRAB CREEK WATERSHED

YEAR	SWC FORM 61 AUG 1963	USDA-ARS	LOCATION (Town, state)		WATERSHED NUMBER	CODE NO.
1965	**DAILY AIR TEMPERATURE** *(degrees F)*		BLACKSBURG, VIRGINIA		CRAB CREEK W-I	13.07

DAY	JAN		FEB		MAR		APR		MAY		JUNE		JULY		AUG		SEPT		OCT		NOV		DEC	
	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN
1	39	30	27	0	63	28	47	29	80	50	81	54	78	59	81	62	75	54	76	52	50	40	39	15
2	58	32	27	7	49	31	46	26	78	58	82	56	78	56	74	59	70	51	67	44	60	32	53	23
3	39	28	23	4	57	32	52	23	85	54	74	54	80	65	76	53	70	53	68	44	71	28	43	34
4	45	26	27	9	45	33	51	38	83	55	63	54	79	63	85	56	70	50	53	36	65	39	39	26
5	50	25	38	11	33	24	70	36	78	57	70	56	83	61	84	58	68	57	58	30	58	32	52	26
6	52	36	59	28	30	22	70	54	82	60	82	57	85	60	88	60	70	54	63	28	66	33	45	28
7	52	31	54	44	41	27	75	53	75	60	80	61	82	65	85	63	77	49	53	45	67	37	35	22
8	63	42	65	52	44	30	70	47	78	56	80	63	85	64	81	65	83	50	64	43	64	36	51	20
9	59	42	52	43	39	31	68	48	83	59	82	63	88	64	80	66	84	57	61	39	60	44	56	28
10	42	28	57	40	36	23	69	42	84	60	86	61	84	64	76	60	87	55	55	41	45	38	55	38
11	36	25	63	51	40	20	65	50	80	58	79	63	78	64	80	56	77	65	72	38	50	38	64	34
11	44	23	61	49	45	28	75	53	71	52	80	64	75	63	86	58	68	63	64	35	48	43	61	48
13	44	26	49	27	49	22	56	42	74	53	78	60	84	60	86	63	78	63	62	28	61	44	64	40
14	30	18	28	21	51	25	60	38	76	48	76	56	85	65	86	67	80	60	72	39	57	40	44	37
15	26	11	41	17	51	28	60	43	78	52	61	52	81	66	89	67	83	63	76	41	58	32	48	36
16	21	15	47	23	59	30	53	39	82	59	54	50	84	62	92	69	82	63	75	44	60	48	46	40
17	21	9	47	34	46	31	67	34	80	61	70	50	85	58	92	67	80	62	62	44	58	26	44	30
18	24	14	56	36	65	32	76	49	78	58	66	48	81	59	90	67	84	62	60	41	36	22	40	30
19	32	10	46	16	45	31	56	44	79	57	72	48	82	61	86	65	84	60	66	44	49	34	36	20
20	40	21	47	13	31	14	62	42	76	57	80	52	76	60	85	64	78	60	66	50	56	27	31	19
21	49	24	56	24	33	8	70	39	70	60	81	54	80	60	70	62	82	60	61	53	48	37	36	24
21	59	31	29	15	50	22	70	51	79	58	84	59	85	61	82	67	80	64	69	51	50	40	50	26
23	58	45	44	18	64	37	80	52	83	59	86	61	88	66	78	66	72	62	56	40	53	32	58	31
24	57	40	35	25	58	44	63	45	83	61	79	64	90	66	78	64	72	52	40	35	48	29	56	41
25	51	37	39	16	44	35	48	42	86	63	72	57	86	71	78	62	60	41	54	28	44	34	55	26
26	64	39	23	15	66	35	75	44	86	62	72	53	84	67	82	64	67	35	63	29	58	40	36	22
27	39	20	52	19	53	29	64	45	82	64	72	57	83	67	85	64	62	43	60	33	58	36	42	17
28	45	19	62	34	65	37	48	43	80	58	86	61	84	62	79	51	58	46	50	30	50	32	46	26
29	38	23			62	52	59	42	68	49	86	64	75	62	68	40	72	48	45	20	36	21	50	24
30	27	10	---	----	52	34	71	45	70	46	81	63	79	58	72	42	68	48	64	18	32	18	62	30
31	20	-2	---	----	52	28	---	----	77	48	---	----	74	61	74	53	---	----	65	30	---	----	64	36
AV.	42	25	44	24	48	29	63	42	78	56	76	57	81	62	81	60	74	55	61	37	53	34	48	28
MEAN	31.0		32.5		37.0		51.5		66.0		67.0		73.0		66.0		61.0		47.0		44.5		39.5	
STA AV	43	24	44	24	53	31	63	39	73	47	79	56	82	60	81	58	76	51	66	40	54	31	44	25

NOTES

Average Monthly Maximum-Minimum Temperature

The average monthly maximum-minimum temperature for the station record is punched on two cards. The first card contains values for January through June, and the second card contains data for July through December. These cards must also be saved for the succeeding year's analysis.

APPENDIX LIST A1. -- LISTING OF THE SOURCE STATEMENTS FOR PROGRAM A

```
C     RROGRAM A
C     PRECIPITATION REDUCTION PROGRAM
$IBFTC D1
      DIMENSION M(12I,MHR(12),P(1200),TIME(1200),IMT(12),PI(12),RECI(12)
C     STORAGE FOR DAYS PER MONTH
      DATA M/31,28,31,30,31,30,31,31,30,31,30,31/
C     TIME INTERVALS FOR MAXIMUM INTENSITY
      DATA IMT/2,5,10,15,20,30,60,120,240,360,720,1440/
      REWIND 0
C     READ FIRST INPUT CARD
  100 READ(5,501)LTYPRE,NEND,IGAGE,IWID,MONTH,NDAY,NYEAR,HR,AMIN,GH,KUP,
     1AT,KSEO
  501 FORMAT(1X,A1,(2,4X,A2,A4,3I2,2(F2.0,8X),F4.2,28X,A3,I5)
      DO 900 I=1,12
  900 RECI(I)=0.
      KRAGE=0
      LSW=0
      K1=1
C     LEAP YEAR
      NYEARO=NYEAR
      LYRE=1
      NRO=0
      A=NYEAR
      A=A/4.
      N=A
      AA=N
      IF(A.FO.AA)GO TO 2
      M(2)=28
      GO TO 3
    2 M(2)=29
C STORAGE OF ACCUMULATED HRS PER MONTH
    3 MTOT=0
      DO 4 I=1,12
      MTOT=MTOT+M(I)*24
    4 MHR(I)=MTOT
C     CONVERT TIME TO HRS AND STORE FIRST INPUT
      HR=HP+AMIN/60.
      L=0
      NUM=1
      KODE=0
      AI=0.
      ACT1=0.
      STAC=0.
      DAC=0.
      AMAC=0.
      YRAC=0.
      ST=0.
      ACP=0.
      ACTIYR=0.
C     COMRUTE RFGINNING ACCUMULATED TIME
      IF(MONTH.NF.1)GO TO 51
      AA=NDAY-1
      T1=AA*24.+HR
      GO TO 52
   51 T=MHR(MONTH-1)
      TT=(NDAY-1)*24
      GO TO(50,12),K1
   50 T1=TT+T+HR
   52 TI=T1
      K1=2
C     OUTPUT FIRST DATA CARD
      NBR=5
      GO TO 700
   54 WRITE(6,515)NUM,IGAGE,IWID,MONTH,NDAY,NYEAR,LTYPRE,HR,TI,AI,ACP,ST
     1AC,DAC,AMAC,KODE
  515 FORMAT(IH I6,3X,A2,3X,A4,I5,I4,I3,10X,AI,F12.4,3X,3F11.4,2F12.4,F1
     10.4,I5)
      WRITE(0,600)IWID,IGAGE,MONTH,NDAY,NYEAR,HR,TI,AI,ACP,STAC,DAC,AMAC
     1,LTYRRE,KODE,KUPDAT,NUM
  600 FORMAT(A4,1X,A2,3I3,F8.4,F10.4,5F8.4,2X,A1,I3,2X,A3,I5)
      NBR=1
      GO TO 700
  730 KSEO0=KSEO
      MONTHO=MONTH
      NDAYO=NDAY
      GHO=GH
      HRO=HR
C READ SECOND DATA CARD
    5 READ(5,500)LTYPRE,NEND,IGAGE,IWID,MONTH,NDAY,NYEAR,HR,AMIN,GH,KSEO
  500 FORMAT(IX,A1,I2,4X,A2,A4,3I2,2(F2.0,8X),F4.2,31X,I5)
      IF(NEND.LT.9)GO TO 10
      LYRE=2
      GO TO 47
   10 HR=HR+AM(N/60.
C     DETERMINE TIME INTERVAL
      IF(MONTH.NE.1)GO TO 51
      AA=NDAY-1
      T2=AA*24.+HR
      GO TO 15
   12 T2=TT+T+HR
   15 TI=T2-T1
      IF(TI.GT.0.0)GO TO 7000
      WRITE(6,7003)IGAGE,IWIL,MONTH,NDAY,NYEAR,HR,KSEO0,KSEO
 7003 FORMAT(1H 9X,A2,3X,A4,I5,14,I3,11X,F12.4,53H  NEGATIVE OR ZERO TIM
     1E INTERVAL BETWEEN CARD NUMBERS,(7,4H AND,I6)
      GO TO 5
 7000 T1=T2
C     END OF STORM SUMMAPY
      IF(GH.GT.GHO)GO TO 55
      ACP=0,
      IF(TI.LT.1.0)GO TO 56
   47 IF(STAC.GE.0.25)GO TO 45
   48 STAC=0.
      ST=0.
      ACP=0.
      AI=0.
      L=0
      GO TO 16
   55 ACP=GH-GHO
   56 AI=ACP/TI
      STAC=STAC+ACP
      YRAC=YPAC+ACP
      IF(ACP.EQ.0.0)GO TO 57
      ACTI=ACTI+TI
      ACTIYR=ACTIYR+TI
   57 L=L+I
      P(L)=ACP
      LL=TI*60.+.5
      ALL=LL
      ST=ST+ALL
      TIME(L)=LL
C     END OF DAY
   16 IF(NDAY.EQ.NDAYO.AND.MONTH.EQ.MONTHO)GO TO 30
      DAC=ACR
      GO TO 31
   30 DAC=DAC+ACP
      GO TO 35
C     END OF MONTH SUMMARY
   31 IF(MONTH.EQ.MONTHO)GO TO 35
      KODE=6
      WRITE(6,520)NUM,IGAGE,IWID,MONTHO,NYEAR,ACTI,AMAC,KODE
  520 FORMAT(1H I6,3X,A2,3X,A4,I5,4X,I3,26X,F11.4,46X,F10.4,I5I
      WRITE(0,601)IWID,IGAGE,MONTHO,NYEAR,ACTI,AMAC,KODE,KUPDAT,NUM
  601 FORMAT(A4,1X,A2,I3,3X,I3,8X,F10.4,32X,F8.4,I6,2X,A3,I5)
      NBR=2
      GO TO 700
  731 GO TO(34,80),LYRE
   34 AMAC=0.
      KODE=0
      ACTI=0.
   35 AMAC=AMAC+ACP
      GO TO 54
C     END OF YEAR SUMMARY
   80 KODE=7
      WPITE(6,510)NUM,IGAGE,IWID,NYEAR,ACTIYR,YRAC,KODE
  510 FORMAT(1H I6,3X,A2,3X,A4,9X,I3,26X,FI1.4,46X,F10.4,I5)
      WRITE(0,602)IWID,IGAGE,NYEAR,ACTIYR,YRAC,KODE,KUPDAT,NUM
  602 FORMAT(A4,1X,A2,6X,I3,8X,F10.4,32X,F8.4,I6,2X,A3,I5I
      NBR=3
      GO TO 700
  732 KODE=3
      NUMA=NUM+I
      WRITE(6,543)NUM,(RECI(I),I=I,6),KODE,NUMA,(RECI(I),I=7,12),KODE
  543 FORMAT(1H0I6,4X,44HMAXIMUM INTENSITY FOR YEAR(2,5,10,15,20,30M),2X
     1,3F11.4,2F12.4,F10.4,I5/1H I6,4X,44HMAXIMUM INTENSITY FOR YEAR(1,2
     2,4,6,12,24HRS),2X,3F11.4,2FI2.4,F10.4,I5)
      WRITE(0,607)IWID,IGAGE,NYEAR,(RECI(I),I=1,6),KODE,KUPDAT,NUM,IWID,
     1IGAGE,NYEAR,(RECI(I),I=7,12),KODE,KUPDAT,NUMA
  607 FORMAT(A4,1X,A2,6X,I3,8X,F10.4,5F8.4,I6,2X,A3,I5/A4,1X,A2,6X,I3,8X
     1,F10.4,5F8.4,I6,2X,A3,I5)
      NUM=NUMA+1
      CALL CHKPT(30)
      IF(NEND.EQ.99)GO TO 803
      NRECD=99
      GO TO 800
  803 NRECD=999
  800 KODE=2
      WRITE(6,608)NUM,NRECD,KUPDAT,KODE
  608 FORMAT(IH I6,8X,I4,55H  WATERSHED IDENTIFICATION FOR UPDATING STOR
     1AGE TAPE = ,A3,47X,I5)
      WRITE(0,604)NRECD,KODE,KUPDAT,NUM
  604 FORMAT(I4,73X,I3,2X,A3,I5(
      IF(NEND.EQ.9)GO TO 100
      REWIND 0
      STOP
C     MAXIMUM INTENSITY FOR SELECTED TIME INTERVALS
   45 DO 148 I=1,12
  148 PI(I(=0.
      DO 250 I=I,I2
      LENO=0
      K=0
      AP=0.
      ATT=0.
      AT=IMT(I)
      IF(AT.GT.ST)GO TO 251
      DO 240 J=I,L
      PROP2=P(J)/TIME(J)
      MM=1
      LEN=TIME(J)
      AP=AP+P(J)
      IF(K.NE.0)GO TO 170
      LENO=LENO+LEN
      ATT=ATT+TIME(J)
      LBEG=LENO-IMT(I)
      IF(LBEG)240,165,160
  160 K=1
      ALBEG=LBEG
      COMP=AP-ALBEG*PROP2
      AMAX=COMP
      IF(J.GT.I)GO TO 163
      MM=IMT(I)+I
      GO TO 169
  163 MM=AT-(ATT-TIME(J))+1.
      GO TO 169
  165 COMP=AP
      AMAX=COMP
      GO TO 240
  169 RPOP1=P(1I/TIME(1)
      AKOUNT=1.
      NN=1
  170 DO 230 N=MM,LEN
      IF(AKOUNT.LE.T(ME(NN))GO TO 186
      NN=NN+1
      AKOUNT=I.
      PROP1=P(NN)/TIME(NN)
  186 COMP=COMP+PROP2-PROR1
      AKOUNT=AKOUNT+I.
      IF(AMAX.LT.COMPIAMAX=COMP
  230 CONTINUF
  240 CONTINUF
  250 PI(I)=60.*AMAX/AT
  251 KODE=9
      NUMA=NUM+I
      NRO=NRO+I
      WRITE(6,525)NUM,IGAGE,IWID,MONTHO,NDAYO,NYEAR,NRO,(PI(II,I=I,6I,KO
     1DE,NUMA,IGAGE,IWID,MONTHO,NDAYO,NYEAR,NRO,(PI(I),I=7,12),KODE
  525 FORMAT(1H I6,3X,A2,3X,A4,I5,I4,I3,I5,21X,3F11.4,2F12.4,F10.4,I5/IH
     1 I6,3X,A2,3X,A4,I5,I4,I3,I5,21X,3F11.4,2F12.4,F10.4,I5)
      WRITE(0,603)IWID,IGAGE,MONTHO,NDAYO,NYEAR,NRO,(PI(I),I=1,6),KODE,K
     1UPDAT,NUM,IWID,IGACE,MONTHO,NDAYO,NYEAP,NRO,(PI(I),I*7,I2),KODE,KU
     2RDAT,NUMA
  603 FORMAT(A4,IX,A2,3I3,3X,I5,F10.4,5F8.4,I6,2X,A3,I5/A4,1X,A2,3I3,3X,
```

APPENDIX LIST A1. -- CONTINUED

```
     II5,F10.4,5F8.4,16,2X,A3,15)
      NUM=NUMA
      LINES=LINES+2
      NBR=4
      GO TO 700
  733 KOOE=0
C     MAXIMUM INTENSITIES FOR PERIOO OF RECORO
      DO 910 I=I,12
      IF(PI(I).GT.REC1(I))RECI(I)=PI(I)
  910 CONTINUE
      GO TO 48
  700 IF(LSW.EQ.0)GO TO 710
      LINES=LINES+1
      IF(LINES.LE.56)GO TO 705
  710 KPAGE=KPAGE+1
      WRITE(6,539)KPAGE
  539 FORMAT(1H1122X,4HPAGE,I3)
      WRITE(6,540)
  540 FORMAT(1H 35X,57HRAINFALL TABULATIONS-WATERSHED ENGINEERING-BLACKS
     IBURG,VA.)
      WRITF(6,541)
  541 FORMAT(131H0  SEQ.  GAGE WATSHO    OATE      STORM TYPE TIME OF OAY
     I  TIME INTERVAL INTENSITY     ACCUM.  STORM ACCUM.  D  ACCUM. MON
     2ACCUM CODE)
      WRITE(6,542)
  542 FORMAT(125H  NUMBER  NO.    NO.  MO. OAY YR   NO. . PREC    HOURS
     1     IN HOURS      (IN/HR)     PER TIME     (INCHES)     (INCHES) (INC
     2HES))
      LINES=6
      IF(LSW.NE.0)GO TO 705
      LSW=I
      GO TO 720
  705 NUM=NUM+1
  720 GO TO(730,731,732,733,54),NBR
      ENO
```

APPENDIX LIST A2. -- DETAILED DESCRIPTION OF THE VARIABLES USED IN PROGRAM A

Input

Symbol	Description
AMIN	Minutes portion of the time of day.
GH	Accumulated precipitation in inches (chart line depth).
HR	Hour portion of the time of day (military time).
IGAGE	Raingage identification.
IWID	Watershed identification.
KSEQ	Sequence number for input data.
KUPDAT	Raingage identification to be used in conjunction with sequence number to update data (input/output) when placed on magnetic tape. (See Table A4).
LTYPRE	Type of precipitation. (See Table A3).
MONTH	Month.
NDAY	Day.
NEND	Code identifying the end of record. NEND = 0: Continue normal processing. (All basic data cards contain a zero.) NEND = 9: End of intermediate raingage station. NEND = 99: Last raingage station.
NYEAR	Year. (Last two digits, e.g., 64 for 1964.)

Output

ACP	Precipitation in inches during time interval TI.
ACTI	Total hours of precipitation for the month.
ACTIYR	Total hours of precipitation for the year.
AI	Intensity for given time interval (in./hr.).
AMAC	Monthly accumulation (precipitation in inches).
DAC	Daily accumulation (precipitation in inchea).
HR	See input.
IGAGE	See input.
IWID	See input.
KODE	Identification for the type of output.
KSEQ	See input.
KSEQO	Sequence number of last data card processed. (See input - KSEQ).
LTYPRE	See input.
MONTH	See input.
NDAY	See input.
NRO	Storm number (all storms ⩾ 0.25 inch are numbered in sequential order beginning with I).
NRECD	End station record code. NRECD = 99: For intermediate stations. NRECD = 999: For last station processed.
NUM	Sequential list number for output.
NUMA	Sequential list number (NUM+1).
NYEAR	See input.
PI(I) I=I,12	Maximum intensity for period of record for time intervals IMT(I) in incbes.
STAC	Storm accumulation (precipitation in inches).
RECI(I) I=1,12	Maximum intensities for selected time intervals IMT(I) for given storm in in./hr.
TI	Time interval (T2-T1) in hours.
YRAC	Yearly accumulation (precipitation in inches).

Main Program

(Input/output variables not included)

A	Becomes NYEAR/4 for leap year test.
AA	Truncated A in leap year test. (See variable N).
AKOUNT	Index counter.
ALBERG	Variable used to determine the initial value of COMP. Equivalent to LBERG.
ALL	See TI.
AMAX	See COMP.
AP	Accumulated precipitation in inchea.

Symbol	Description
CHKPT(30)	Closed library subroutine for the IBM 7040 system which allows restarting the program at the location indicated by CHKPT(30) in the event of machine failure.
COMP	Maximum precipitation for selected time interval in in./hr.
GHO	Chart line depth in inches for the last data card read.
HRO	Hour of the last data card read.
I	Variable integer used to index IMT(I), M(I), RECI(I), PI(I), MHR(I).
J	Variable integer used to index TIME(J), P(J).
K	Index code having possible values of 0 or 1. K = 0: The first value of maximum intensity search. K = 1: Subsequent values.
K1	Index code having possible values of 1 or 2. K1 = 1: First data card for given station. K1 = 2: Subsequent data.
KPAGE	Sequential page number.
L	Variable integer used to index TIME(L), P(L) and represents the upper limit of the maximum intensity search routine.
LBEG	Defined as: LBEG = LENO = IMT(I). This variable used to initiate the maximum intensity search.
LEN	Length of time interval in minutes that is being searched for a maximum value.
LENO	Accumulated time in minutes from the beginning of the maximum intensity search.
LINES	Number of lines printed per page.
LL	Time interval in minutes.
LSW	Variable index having possible values of 0 or 1. LSW = 0: Print on a new page. LSW = 1: Continue printing on the same page.
LYRE	Variable index having possible values of 1 or 2. LYRE = 1: Normal processing. LYRE = 2: End of year summary.
M(I) I=1,12	Number of days per month, e.g., January has 31, February 28 or 29, etc.
MHR(I) I=1,12	Accumulated hours by months for the year.
MM	Variable integer sepcifying the beginning of the search routine.
MONTHO	Month of the last data card processed.
MTOT	Accumulated hours for the year.
N	Truncated A; equivalent to AA.
NBR	Variable integer used to obtain multiple branching from the page number routine.
NDAYO	Day of last data card processed.
NN	Variable integer used to monitor the progression of the leading search mesh.
NYEARO	NYEAR.
P(L) L=1,1200	Precipitation for given time interval in inches.
PROP1	Precipitation per minute for trailing edge of search mesh.
PROP2	Precipitation per minute for leading edge of search mesh.
ST	Duration of storm event in minutes.
T	Accumulated time in hours to the beginning of MONTH.
T1	Accumulated time in hours from the beginning of the year to the beginning of TI.
T2	Accumulated time in hours from the beginning of the year to the end of TI.
TIME(L) L=1,1200	Time intervals in minutes.
TT	Defined as: TT = (NDAY - 1) * 24 (hours).

APPENDIX LIST B1. -- LISTING OF THE SOURCE STATEMENTS FOR PROGRAM B

```
C      PROGRAM B
C      RUNOFF REDUCTION PROGRAM
$IBFTC DA
       DIMENSION M(12).MHR(12).GAGR(170).CFSR(170).GAGP(50).CFSP(50).FLOW
      1(25).VOLM(7).MDATE(7).NDATE(7).Q(25).QT(25).QYR(25).QTYR(25).RPOND
      2(15).RRAT(15).AMAX(7).R(600).T6(600).KST(7).AKST(7).AMHR(12).COMP(
      37).PROP3(7).TDAY(7).PER(125)
C      VECTOR FOR DAYS PER MONTH
       DATA M/31.28.31.30.31.30.31.31.30.31.30.31/
       NRAPBR=1
       REWINO 0
C      LOAD FLOW DURATION LIMITS
       DO 40 J=1.25.5
       JJ=J+4
   40  READ(5.610)(FLOW(I).I=J.JJ)
  610  FORMAT(5F6.5)
C      LOAD MAXIMUM VOLUME LIMITS
       READ(5.615)(VOLM(I).I=1.7)
  615  FORMAT(7F5.0)
    1  READ(5.600)NBR.J3.J4.J6.J7
  600  FORMAT(5I1)
C      LOAD RATE AND PONDAGE CORRECTION FACTORS
       GO TO(9000.9001).J6
 9001  DO 41 I=1.15
   41  READ(5.616)ID1.RPOND(ID1).RRAT(ID1)
  616  FORMAT(I2.2F10.10)
C      INITIALIZATION
 9000  WRITE(6.9551)
 9551  FORMAT(1H137X.49HRUNOFF COMPUTATIONS-WATERSHED ENGINEERING-BLACKSB
      1.7HURG.VA./1H09X.33HBASIC CONSTANTS USED FOR ANALYSES/34H0
      2 BASE FLOW OURATION RATES)
       DO 2093 J=1.25.5
       JJ=J+4
 2093  WRITE(6.2077)(FLOW(I).I=J.JJ)
 2077  FORMAT(10X.5F8.5)
       WRITE(6.2078)(VOLM(I).I=1.7).NBR.J3.J4.J6.J7
 2078  FORMAT(40H0            MAXIMUM VOLUME LIMITS(MINUTES)/10X.7F7.0/24H0
      1          PARAMETER DATA/10X.4HNBR=.I2.4H J3=.I2.4H J4=.I2.4H J6=.I2
      2.4H J7=.I2/47H0            RATING AND PONDAGE CORRECTION FACTORS)
       DO 42 I=1.15
   42  WRITE(6.2092)I.RPOND(I).RRAT(I)
 2092  FORMAT(I0X.I4.2(4X.F12.10))
       GO TO(3.9021).NRAPBR
    3  K=0
       KNUM=0
       KPAGE=0
       KP=0
       RUNTI=0.
       ACDR=0.
       ACMR=0.
       ACYRR=0.
       KODE=0
       KV=0
       KV3=0
       TOTYRR=0.
       TOTAL=0.
       TOTALO=0.
       TOTYRQ=0.
       NUM=1
       LINES=0
       LSW=0
       NFLOW=1
       OO 6000 I=1.7
 6000  AMAX(I)=0.
       DO 16 I=I.25
       Q(I)=0.
       OYR(I)=0.
       OTYR(I)=0.
   16  OT(I)=0.
C      LOAD PONDAGE AND RATE TABLES
       GO TO(38.9020).J7
 9021  LSW=0
       LP=7
       GO TO 2000
 9020  GO TO(25.20).NBR
   20  DO 23 J=1.50
       REAO(5.605)GAGP(J).CFSP(J).JEND
  605  FORMAT(F4.2.6X.F5.2.49X.I5X.I1)
       IF(JENO.EO.9)GO TO 25
   23  CONTINUE
   25  DO 34 J=1.170
       REAO(5.606)GAGR(J).CFSR(J).JEND
  606  FORMAT(F4.2.6X.F10.6.49X.10X.I1)
       IF(JEND.EO.9)GO TO 38
   34  CONTINUE
   38  GO TO(50.51).NRAPBR
   50  READ(5.620)IW.IDW.MONTH.NOAY.NYEAR.HR.AM.HT.NEST.NEND.NTCH.KUP.KS
      1O
  620  FORMAT(5I2.2(F2.0.8X).F4.2.A1.14X.I2.8X.I1.12X.A3.I5)
       IF(NENO.GE.9)GO TO 953
       IF(NTCH.NE.9)GO TO 51
       NRAPBR=2
       GO TO 1
   51  MR=HR+AM/60.
       IF(K.NE.0)GO TO 55
C      LEAP YEAR
       A=NYEAR
       A=A/4.
       N=A
       AA=N
       IF(A.EO.AA)GO TO 90
       M(2)=28
       GO TO 100
   90  M(2)=29
C      STORAGE OF ACCUMULATED HRS PER MONTM
  100  MTOT=0
       DO 105 I=1.12
       MTOT=MTOT+M(I)*24
       AMHR(I)=M(I)*24
  105  MHR(I)=MTOT
       AMHT=MHR(12)
       IWIO=IW*100+IDW
       MP=MONTH
       NP=NDAY
       TP=HR
       PEAK=0.
       KUPOAT=KUP
       LB=6
       GO TO 2000
   55  IF(MONTH.NE.1)GO TO 65
       AA=NOAY-1
       T1=AA*24.+HR
C      BRANCH TO RATE ANO PONDAGE TABLES-STATEMENT 700
       GO TO 700
   65  T=MHR(MONTH-1)
       TT=(NDAY-1)*24
       T1=TT+T+HR
       GO TO 700
   66  IF(K.GT.0)GO TO 80
       TI=T1
       GO TO(79.210).NBR
   80  TI=T1-T10
       IF(TI.LE.0.0)GO TO 217
       GO TO(3078.210).NBR
  217  WRITE(6.3082)IWIO.MONTH.NDAY.NYEAR.HR.HT.TI.KSEOO.KSEO
 3082  FORMAT(1H I5.3I3.F8.4.F7.2.F10.4.53H  NEGATIVE OR ZERO TIME INTERV
      1AL BETWEEN CARD NUMBERS.I5.4H AND.I5)
       GO TO 50
 3078  RRATE=(RATE+RATEO)/2.
 3079  IF(PEAK.GT.RRATE)GO TO 82
       PEAK=RRATE
       MP=MONTH
       NP=NDAY
       TP=MR
       IF(NBR.EO.2)TP=HRO
   82  GO TO(81.161).NBR
   81  RUNTI=RRATE*TI
       ACDR=ACDR+RUNTI
       ACYRR=ACYRR+RUNTI
   79  IF(K.EO.0)GO TO 110
  161  GO TO(85.86).NBR
   85  IF(MONTHO.EO.MONTH)GO TO 160
   87  KOOE=8
C      BRANCH TO FLOW DURATION OUTPUT ROUTINE
       GO TO 900
   86  IF(MONOO.EO.MONTHO)GO TO 160
       STM=MONTHO
       MONTHO=MONOO
       GO TO 87
  951  ACMR=RUNTI
       KODE=0
       CALL CHKPT(30)
       GO TO 111
  160  ACMR=ACMR+RUNTI
  111  GO TO(110.218).NBR
  110  GO TO(3001.3000).J3
 3000  WRITE(6.791)IWID.MONTH.NDAY.NYEAR.HR.HT.TI.RATE.RRATE.RUNTI.ACDR.A
      1CMR.ACYRR.NEST.KOOE.NUM
  791  FORMAT(1H I5.3I3.F8.4.F7.2.F10.4.23X.F11.5.F13.6.4F9.5.A1.I2.I6)
       WRITE(6.960)IWID.MONTH.NDAY.NYEAR.HR.HT.TI.RATE.RRATE.RUNTI.ACDR.A
      1CMR.ACYRR.NEST.KODE.KUPDAT.NUM
  960  FORMAT(I5.3I3.F8.4.F6.2.F10.4.21X.6F10.5.A1.I2.1X.A3.I5)
       LB=1
       GO TO 2000
 3001  IF(K.GT.0)GO TO 84
       K=1
       GO TO 70
   84  IF(HR.NE.24.0)GO TO 177
       AVGOR=ACDR/24.
       KODE=7
 3007  GO TO(3008.3009).J3
 3009  WRITE(6.792)IWIC.MONTH.NDAY.NYEAR.AVGDR.ACDR.ACYRR.KODE.NUM
  792  FORMAT(1H I5.3I3.59X.F13.6.2(9X.F9.5).I3.I6)
       WRITE(6.961)IWID.MONTH.NDAY.NYEAR.AVGDR.ACDR.ACYRR.KODE.KUPDAT.NUM
  961  FORMAT(I5.3I3.55X.2(F10.5.I0X).F10.5.I3.1X.A3.I5)
       LB=2
       GO TO 2000
 3008  ACDR=0.
       KOOE=0
C      BRANCH TO FLOW DURATION SUMMARY ROUTINE
  177  GO TO(179.178).NBR
  179  IF(HT.EO.0.0.AND.HTO.EQ.0.0)GO TO 1500
       GO TO 800
  178  IF(HTO.EO.0.0.AND.HT00.EO.0.0)GO TO 1500
       GO TO 800
C      BRANCH TO MAXIMUM VOLUME SEARCH ROUTINE
 1500  GO TO(1302.1000).J4
 1302  IF(NEND.EO.9.OR.NEND.EQ.99)GO TO 87
   70  GO TO(75.76).NBR
   75  HRO=HR
       MONTHO=MONTH
       T10=T1
   76  KSEQO=KSEQ
       RATEO=RATE
       GO TO(50.69).NBR
   69  PONDO=POND
       AJRATO=AJRATE
       IF(KNUM.GE.2)AVGO=AVG
       MONOO=MONTHO
       HTOO=HTO
       HTO=STHT
       T10=STT1
       T10=STT1
       HRO=STHR
       MONTHO=STMO
       NDAYO=STNO
       GO TO 50
  210  KNUM=KNUM+I
       STNO=NDAY
       STMO=MONTM
       STT1=T1
       STTI=TI
       STHR=HR
       STHT=HT
       IF(KNUM.NE.1)GO TO 215
       K=1
       AJRATE=RATE
       RRATE=RATE
       PCORRO=0.
       HTOO=HT
       MONOO=MONTH
```

APPENDIX LIST B1. -- CONTINUED

```
      GO TO 70
  215 DELGH=HT-HTO
      AVG=DELGH/TI
      IF(KNUM.LT.3)GO TO 218
  214 DAVG=AVG+AVGO
      PCORRO=DAVG*PONDO
      AJRATE=PATEO+PCORRO
      IF(KP.NE.0)GO TO 216
      KP=1
      AJRATO=AJRATO+PCORRO
  216 RRATE=(AJRATE+AJRATO)/2.
      IF(RRATE.LT.0.0)RRATE=0.
      RUNTI=RRATE*TIO
      ACDR=ACDR+RUNTI
      ACYRR=ACYRR+RUNTI
      GO TO 3079
  218 GO TO(3011,3010),J3
 3010 WRITE(6,794)IWID,MONTHO,NDAYO,NYEAR,HRO,HTO,TIO,RATEO,PCORRO,AJRAT
     1E,RRATE,RUNTI,ACDR,ACMR,ACYRR,NEST,KODE,NUM
  794 FORMAT(1H I5,3I3,F8.4,F7.2,F10.4,F10.6,F13.8,F11.5,F13.6,4F9.5,A1,
     1I2,I6)
      WRITE(0,964)IWIU,MONTHO,NDAYO,NYEAR,HRO,HTO,TIO,RATEO,PCORRO,AJRAT
     1E,RRATE,RUNTI,ACDR,ACMR,ACYRR,NEST,KODE,KUPDAT,NUM
  964 FORMAT(I5,3I3,F8.4,F6.2,F10.4,F10.5,F11.8,6F10.5,A1,I2,1X,A3,I5)
      LB=3
      GO TO 2000
 3011 IF(KNUM.LT.3)GO TO 70
      HR=HRO
      TI=TIO
      TI=TIO
      MONTH=MONTHO
      NDAY=NDAYO
      GO TO 84
C     END OF YEAR
  953 GO TO(903,955),NBR
  903 KODE=8
      GO TO 900
  955 AVG=0.
      GO TO 214
  956 KODE=6
      GO TO(1111,4070),J4
 4070 WRITE(6,796)
  796 FORMAT(44H0 MAXIMUM VOLUME FOR SELECTED TIME INTERVALS)
      LINES=LINES+2
      DO 4071 I=1,7
      IF(I.EQ.1)GO TO 4071
      IF(AMAX(I).GE.AMAX(I-1))GO TO 4071
      AMAX(I)=AMAX(I-1)
      MDATE(I)=MDATE(I-1)
      NDATE(I)=NOATE(I-1)
      TDAY(I)=TDAY(I-1)
 4071 CONTINUE
      DO 190 I=1,7
      HRS=VOLM(I)/60.
      WRITE(6,795)IWID,MDATE(I),NDATE(I),NYEAR,TDAY(I),AMAX(I),HRS,KODE,
     1NUM
  795 FORMAT(1H I5,3I3,F8.4,F12.5,F10.0,78X,I3,I6)
      WRITE(0,962)IWID,MDATE(I),NDATE(I),NYEAR,TDAY(I),AMAX(I),HRS,KODE,
     1KUPDAT,NUM
  962 FORMAT(I5,3I3,F8.4,F9.5,F6.0,82X,I3,1X,A3,I5)
      LB=4
      GO TO 2000
  190 CONTINUE
      WRITE(6,185)IWID,MP,NP,NYEAR,TP,PEAK,KODE,NUM
  185 FORMAT(25H0 PEAK DISCHARGE FOR YEAR/1H I5,3I3,F8.4,F12.5,88X,I3,I6
     1)
      WRITE(0,186)IWID,MP,NP,NYEAR,TP,PEAK,KODE,KUPDAT,NUM
  186 FORMAT(I5,3I3,F8.4,F9.5,88X,I3,1X,A3,I5)
 1111 IF(NEND.EQ.99)GO TO 3089
      NRECD=99
      GO TO 3088
 3089 NRECD=999
 3088 KODE=2
      NUM=NUM+1
      WRITE(6,188)NRECD,NYEAR,KUPDAT,KODE,NUM
  188 FORMAT(1H I5,6X,I3,55H  WATERSHED IDENTIFICATION FOR UPDATING STOR
     1AGE TAPE = ,A3,50X,I3,I6)
      WRITE(0,187)NPECD,KODE,KUPDAT,NUM
  187 FORMAT(I5,114X,I3,1X,A3,I5)
      NRAPPR=1
      IF(NEND.EQ.9)GO TO 1
      REWIND 0
      STOP
C     PONDAGE AND RATING TABLE COMPUTATIONS
  700 GO TO(721,710),NBR
C     PONDAGE
  710 DO 730 I=1,50
      IF(HT-GAGP(I))716,715,730
  715 POND=CFSP(I)*RPONO(IDW)
      GO TO 721
  716 PROP1=(HT-GAGP(I-1))*100.
      PROP2=(GAGP(I)-GAGP(I-1))*100.
      DIVS=(CFSP(I)-CFSP(I-1))/PROP2
      POND=(CFSP(I-1)+PROP1*DIVS)*RPOND(IDW)
      GO TO 721
  730 CONTINUE
C     NO PONDAGE
  721 DO 740 I=1,170
      IF(HT-GAGR(I))735,725,740
  725 RATE=CFSR(I)*RRAT(IDW)  .
      GO TO 66
  735 PROP1=(HT-GAGR(I-1))*100.
      PROP2=(GAGR(I)-GAGR(I-1))*100.
      DIVS=(CFSR(I)-CFSR(I-1))/PROP2
      RATE=(CFSR(I-1)+PROP1*DIVS)*RRAT(IDW)
      GO TO 66
  740 CONTINUE
      GO TO 66
C     FLOW DURATION COMPUTATIONS
  800 DO 810 I=1,25
      IF(RRATE.LE.0.0)GO TO 820
      IF(FLOW(I).GT.RRATE)GO TO 819
      Q(I)=Q(I)+RUNTI
      QT(I)=QT(I)+TI
      QYR(I)=QYR(I)+RUNTI
      QTYR(I)=QTYR(I)+TI
  810 CONTINUE
  819 TOTALO=TOTALO+PUNTI
      TOTYRO=TOTYRO+RUNTI
      TOTAL=TOTAL+TI
      TOTYRR=TOTYRR+TI
  820 GO TO 1500
C     OUTPUT FOR FLOW DURATION
  900 DO 910 I=1,25
      L1=I+25
      L2=L1+25
      L3=L2+25
      L4=L3+25
      GO TO(901,902),NFLOW
  901 PER(I)=(QT(I)/TOTAL)*100.
      PER(L1)=(QT(I)/AMHR(MONTHO))*100.
      PER(L2)=(Q(I)/TOTALQ)*100.
      PER(L3)=Q(I)
      PER(L4)=QT(I)
      GO TO 910
  902 PER(I)=(QTYR(I)/TOTYRR)*100.
      PER(L1)=(QTYR(I)/AMHT)*100.
      PER(L2)=(QYR(I)/TOTYRO)*100.
      PER(L3)=QYR(I)
      PEP(L4)=QTYR(I)
  910 CONTINUE
      LINES=LINES+2
      DO 937 I=1,125,5
      JJ=I+4
      IF(I.GT.75)GO TO 5500
      IF(I.EQ.51)WRITE(6,922)
  922 FORMAT(1H049X,31X,40HFLOW DURATION AS PERCENT OF TOTAL RUNOFF)
      IF(I.EQ.26)WRITE(6,920)
  920 FORMAT(1H049X,31X,38HFLOW DURATION AS PERCENT OF TOTAL TIME)
      IF(I.EQ.1)WRITE(6,911)
  911 FORMAT(1H049X,31X,48HFLOW DURATION AS PERCENT OF TIME RUNOFF OCCUR
     1RED)
      GO TO(5055,5056),NFLOW
 5055 WRITE(6,921)IWID,MONTHO,NYEAR,(PER(J),J=I,JJ),KODE,NUM
  921 FORMAT(1H I5,I3,3X,I3,61X,F7.2,1X,4F9.2,2I6)
      GO TO 5100
 5056 WRITE(6,943)IWID,NYEAR,(PER(J),J=I,JJ),KODE,NUM
  943 FORMAT(1H I5,6X,I3,61X,F7.2,1X,4F9.2,2I6)
      GO TO 5300
 5100 WRITE(0,970)IWID,MONTHO,NYEAR,(PER(J),J=I,JJ),KODE,KUPDAT,NUM
  970 FORMAT(I5,I3,3X,I3,54X,5F10.4,I4,1X,A3,I5)
      GO TO 935
 5500 IF(I.GT.100)GO TO 5200
      IF(I.EQ.76)WRITE(6,923)
  923 FORMAT(1H049X,31X,28HACC RUNOFF ABOVE GIVEN RATES)
      GO TO(5101,5102),NFLOW
 5101 WRITE(6,926)IWID,MONTHO,NYEAR,(PER(J),J=I,JJ),KODE,NUM
  926 FORMAT(1H I5,I3,3X,I3,62X,F9.5,1X,4F9.5,I3,I6)
      GO TO 5100
 5102 WRITE(6,946)IWID,NYEAP,(PER(J),J=I,JJ),KODE,NUM
  946 FORMAT(1H I5,6X,I3,62X,F9.5,1X,4F9.5,I3,I6)
      GO TO 5300
 5200 IF(I.EQ.101)WRITE(6,924)
  924 FORMAT(1H049X,31X,36HACC TIME OF RUNOFF ABOVE GIVEN RATES)
      GO TO(5201,5202),NFLOW
 5201 WRITE(6,927)IWID,MONTHO,NYEAP,(PER(J),J=I,JJ),KODE,NUM
  927 FORMAT(1H I5,I3,3X,I3,60X,F9.3,1X,4F9.3,I5,I6)
      GO TO 5100
 5202 WRITE(6,948)IWID,NYEAP,(PER(J),J=I,JJ),KODE,NUM
  948 FORMAT(1H I5,6X,I3,60X,F9.3,1X,4F9.3,I5,I6)
 5300 WRITE(0,971)IWID,NYEAR,(PER(J),J=I,JJ),KODE,KUPDAT,NUM
  971 FORMAT(I5,6X,I3,54X,5F10.4,I4,1X,A3,I5)
  935 LB=5
      GO TO 2000
 2001 IF(I.EQ.101.OR.I.EQ.76)GO TO 936
      IF(I.EQ.51.OR.I.EQ.26)GO TO 936
      IF(I.NE.1)GO TO 937
  936 LINES=LINES+2
  937 CONTINUE
      DO 938 I=1,125
  938 PER(I)=0.
      DO 939 I=1,25
      Q(I)=0.
  939 QT(I)=0.
      TOTALQ=0.
      TOTAL=0.
      IF(NEND.LT.9)GO TO 5305
      IF(NFLOW.EQ.2)GO TO 956
      NFLOW=2
      KODE=9
      GO TO 900
 5305 IF(NBR.EQ.2)MONTHO=STM
      GO TO 951
C     MAXIMUM VOLUME SEARCH
 1000 IF(KV.NE.0)GO TO 1005
      LEN=0
      SUMS=0.
      KS=0
      KSS=0
      RTOT=0.
      TOT=0.
      DO 1003 I=1,7
      KST(I)=1
 1003 AKST(I)=1.
 1005 KV=KV+1
      IF(KV.GE.601)KV=1
      R(KV)=PUNTI
      LL=TI
      ALL=LL
      LLL=(TI-ALL)*60.+.5
      LLL=LLL+60*LL
      T6(KV)=LLL
      TOT=TOT+T6(KV)
      RTOT=RTOT+RUNTI
```

APPENDIX LIST B1. -- CONTINUED

```
      MM=1
      IF(T6(KV).LT.VOLM(7I)GO TO 1DD8
      KV=0
      KV3=1
      GO TO 1302
 1008 OO 1100 I=1.7
      IF(TOT-VOLM(I))105D.1D8D.1D20
 1020 IF(KS.NE.0)GO TO 1D55
      IF(KSS.NE.7) GO TO 1D11
      KS=1
      GO TO 1055
 1011 IF(I.LE.KSS)GO TO 1055
      IF(KV.NE.1IGO TO 1035
      MM=VOLM(I)+1.
      KSS=KSS+1
      PROP4=R(1)/T6(1)
      COMP(1)=PROP4*VOLM(I)
      PROP3(I)=PROP4
      GO TO 1054
 1D35 LLLL=VOLM(1)
      KSS=KSS+1
      MM=LLLL-LEN+1
      PROP4=R(KV)/T6(KV)
      A=MM-1
      COMP(I)=SUMS+A*PROP4
      PROP3(I)=R(1)/T6(1)
 1054 IF(KV3.NE.0)GO TO 1D56
      AMAX(I)=COMP(1)
      NDATE(I)=NOAY
      MDATE(1)=MONTH
      TOAY(I)=HR
      GO TO 1056
 1055 PROP4=R(KV)/T6(KV)
 1056 NN=KST(1)
      AKOUNT=AKST(I)
      DO 1040 J=MM.LLL
      IF(AKOUNT.LE.T6(NN))GO TO 1070
      NN=NN+1
      AKOUNT=1.
      IF(NN.EO.6D1)NN=1
      PROP3(I)=R(NN1/T6(NN)
 107D COMP(1)=COMP(I)+PROP4-PROP3(I)
      AKOUNT=AKOUNT+1.
      IF(AMAX(I).GE.COMP(1))GO TO 1D40
      AMAX(I)=COMP(1)
      MDATE(1)=MONTH
      NDATE(I1=NOAY
      TOAY(I)=HR
 1040 CONTINUE
      KST(I)=NN
      AKST(I)=AKOUNT
      GO TO 110D
 108D IF(KV3.NE.D)GO TO 1D81
      AMAX(I)=RTOT
      NDATE(1)=NDAY
      MDATE(1)=MONTH
      TOAY(I)=HR
 1081 COMP(I)=RTOT
      PROP3(1)=P(1)/T6(1)
      KSS=KSS+1
 1100 CONTINUE
      GO TO 1302
 1050 SUMS=SUMS+RUNTI
      LEN=LEN+LLL
      GO TO 1302
 2000 IF(LSW.EO.0)GO TO 2D05
      LINES=LINES+1
      IF(LINES.LE.55)GO TO 2D20
 2005 KPAGE=KPAGE+1
      WRITE(6.2709)KPAGE
 2709 FORMAT(1H1122X.4HPAGE.I3)
      WRITE(6.2710)
 2710 FORMAT(1H 37X.56HRUNOFF COMPUTATIONS-WATERSHEO ENGINEERING-BLACKSB
     1URG.VA.)
      WRITE(6.2711)
 2711 FORMAT(132HOWSHED   OATE   TIME OF GAGE HT TIME INT OUTFLOW RATE
     1 POND    RUNOFF RATE  AVG RO RATE RO TIME  ACCUM OA ACCUM MO ACCUM
     2 YR    SEO.)
      WRITE(6.2712)
 2712 FORMAT(132H  NO.  MO DA YR   OAY    (FT.)   (HRS.)    (IN/HR)
     1 CORR       (IN/HR)       (IN/HRI   INT(IN)  RO(IN.)  RO(IN.)  RO(IN
     2.) COOE NO.)
      LINES=4
      IF(LSW.NE.0)GO TO 2020
      LSW=1
      GO TO 2021
 2020 NUM=NUM+1
 2021 GO TO(30D1.3D08.3011.190.2DD1.55.9D2D).LB
      END
```

APPENDIX LIST B2. -- DETAILED DESCRIPTION OF THE VARIABLES USED IN PROGRAM B

Input

Symbol	Description
AM	Minutes portion of time of day (military time hrs. - min.).
CFSP(J) J=1,50	Ponding surface area in square inches.
CFSR(J) J=1,50	Oischarge rates in CFS.
FLOW(I) I=1,25	Selected discharge rates (in./hr.) from which flow duration computations are made.
GAGP(J) J=1,50	Gage height in feet at which the corresponding Jth value of CFSP(J) applies.
GAGR(J) J=1,17D	Gage height in feet at which the corresponding Jth value of CFSR(J) applies.
HR	Hour portion of time of day (military time hrs. - min.).
HT	Gage height in feet.
I	Variable integer for indexing FLOW(I) and VOLM(I).
IDW	Last two digits of watershed identification code.
ID1	Variable integer for indexing RPOND(ID1) and RRAT(ID1). IO1 is equivalent to IDW.
IW	The first two digits of the watershed identification code.
J	Variable integer for indexing CFSR(J), CFSP(J), GAGP(J), GAGR(J) and as an index of do loops to read FLOW(I) and VOLM(I).
J3	Index code having possible values of 1 or 2. J3=1: All output suppressed except flow duration, maximum volumes, and peak discharge for the year. J3=2: Normal output.
J4	Index code having possible values of 1 or 2. J4=1: No maximum volume search. J4=2: Maximum volume search performed.
J6	Index code having possible values of 1 or 2. J6=1: No pondage or rate conversion table required. J6=2: The above tables are required.
J7	Index code having possible values of 1 or 2. J7=1: No rating or pondage table required. J7=2: Rating and pondage tables are required.
JEND	Index code having possible values of 0 or 9. JEND=D: The rating or pondage table, whichever is being loaded, has not been completely loaded. JEND=9: Last card of the rating or pondage table.
JJ	Variable index specifying the upper limit of I in the read loop for FLOW(I), VOLM(I).
KSEQ	Sequential card number.
KUP	Identification code. This code is used for updating input/output tapes.
MONTH	Two digit integer for the month of the year, e.g., 01 for January.
NBR	Index code having possible values of 1 or 2. NBR=1: No pondage corrections to be made. NBR=2: Pondage corrections are required.
NDAY	Two digit integer for the day of the month, e.g., 12 for February 12.
NEND	Index code having possible values of D, 9, or 99. NEND=D: Continue normal processing. All regular data cards will contain a D or blank space for NEND. NEND=9: End of the station record being processed, but additional records to follow. The 9-punch is always placed in the trailer card. NEND=99: End of all runoff processing. The 99 is punched in the trailer card of the last station being processed.
NEST	Identification code specifying whether or nor gage height (HT) has been estimated. NEST=blank space: Correct HT. NEST=E: Estimated HT.
NTCH	Index code having possible values of 0 or 9. NTCH=D: The station rating curve has not been changed during the year. NTCH=9: The station rating or pondage table has been changed at some specific time during the year. A 9-punch is placed in column 6D of the first data card for which the change in rating or pondage begins. The new rating and pondage tables must follow this data card.
NYEAR	Two digit integer representing the year, e.g., 64 for 1964.

APPENDIX LIST B2. -- CONTINUED

Symbol	Description
RPOND(IO1) IO1=1,15	Pondage conversion factor defined as: $RPOND(IO1) = \frac{S(12\ in./ft.)}{2(A)}$ Where S = Scale of the pondage area map in sq. ft./sq. in. A = Watershed area in sq. ft. ID1 = Watershed identification for indexing.
RRAT(IO1) IO1=1,15	Rating table conversion factor to convert CFS to IN/HR.
VOLM(I) I=1,7	Time intervals (minutes) for maximum volume search.

Output

Symbol	Description
ACDR	Accumulated daily runoff in inches.
ACMR	Accumulated monthly runoff in inches.
ACYRR	Accumulated yearly runoff in inches.
AJRATE	Discharge in in./hr. corrected for pondage.
AMAX(I) I=1,7	Maximum volume (inches) for selected time intervals VOLM(J).
AVGOR	Average daily discharge in in./hr.
FLOW(I) I=1,25	See input.
HR	Time of day in hours.
HRO	Previous value of HR.
HRS	Defined as: HRS = VOLM(I)/60 (conversion of time in minutes to hours).
HT	See input.
HTO	Previous value of HT.
I	Variable integer for indexing FLOW(I), VOLM(J), RPOND(I), RRAT(I), MDATE(I), NDATE(I), TDAY(I), AMAX(I), and for determining the lower limit of the write loop for PER(J).
IWID	Watershed identification code.
J	Variable integer for indexing PER(J).
J3,J4,J6,J7	See input.
JJ	Variable integer for determining the upper limit of the write loop for PER(J).
KOOE	Identification code having possible values of 0, 2, 6, 7, 8 or 9. KOOE = 0: Regular output list. One line of output for each input card. KOOE = 2: End of station record. KOOE = 6: Maximum volumes for selected time intervals VOLM(I) and peak discharge rate for the year. KOOE = 7: Daily runoff summary. KODE = 8: Monthly flow duration summary. KODE = 9: Yearly flow duration summary.
KPAGE	Sequential page number for output listing from S.Su06.
KSEQ	See input.
KSEQO	Previous value of KSEQ.
KUPDAT	KUP.
MDATE(I) I=1,7	Months in which the maximum volume for selected time intervals VOLM(I) ended.
MONTH	See input.
MONTHO	Previous value of MONTH.
MP	Month in which the maximum discharge for the year occurred.
NBR	See input.
NDATE(I) I=1,7	Days in which the maximum volume for selected time intervals VOLM(I) ended.
NDAY	See input.
NDAYO	Previous value of NDAY.
NEST	See input.
NP	Day in which the maximum peak discharge for the year occurred.
NRECO	Identification code having possible values of 99 or 999. NRECD = 99: The 99 code is the last output line for the years record. Subsequent records are to be written on this tape. NRECD = 999: The 999 code is also the last output line for the years record, however, no subsequent records are to be written.
NUM	Sequential list number.
NYEAR	See input.
PCORRO	Pondage correction (in./hr.).
PEAK	The peak discharge that occurred during the year.
PER(J) J=1,125	Flow duration summaries for either month or year. J=1,25: Flow duration summary based on the percentage of time runoff actually occurred. J=26,50: Flow duration summary based on the percentage of total time (hrs. per year). J=51,75: Flow duration summary based on the percentage of total runoff. J=76,100: Accumulated volume of runoff occurring at rates ≥ to given base rates (FLOW(I)). J=101,125: Accumulated time that runoff occurred at rates ≥ to given base rates (FLOW(I)).
RATE	Discharge rate from rating table converted to in./hr.
RATEO	Previous value of RATE.
RPOND(I) I=1,15	See input.
RRAT(I) I=1,15	See input.
RRATE	Average discharge rate for given time interval in in./hr.
RUNTI	Runoff for time interval in inches.
TDAY(I) I=1,7	Time of day (hours) that the maximum volume (AMAX(I)) for selected time intervals (VOLM(I)) ended.
TI	Time interval (hours) between two respective gage height readings (HT and HTO).
TIO	Previous value of TI.
TP	Time of day in hours that the maximum peak discharge occurred.
VOLM(I)	See input.

PROGRAM

(Input/output variables are not included)

Symbol	Variable Description
A	Two definitions: 1. Year divided by 4 (leap year test). 2. Defined as MM-1 and used to determine the initial runoff volume for the selected time intervals (VOLM(I)).
AA	Two definitions: 1. A truncated (N) (leap year test). 2. Defined as NDAY-1 and used for locating the time of day on the time curve.
AJRATO	Previous value of AJRATE (see output).
AKOUNT	Counter that monitors the progress of the trailing edge of the maximum volume search mesh as it progresses through the time interval specified by T6(NN).
AKST(I) I=1,7	The values of AKOUNT at the end of each maximum volume search.
ALL	Time interval (hours) truncated (LL).
AMHR(I) I=1,12	Total hours per month.
AMHT	Total hours per year.
AVG	Defined as: AVG = OELGH/TI
AVGO	Previous value of AVG.
CHKPT(30)	Library subroutine for IBM 7040. This routine will write necessary restart instructions at 30-minute increments. If machine failure, etc., occurs the program may be restarted at the point specified by CHKPT(30).
COMP(I) I=1,7	A running record of the maximum volumes for selected time intervals VOLM(I).
OAVG	Defined as: DAVG = AVG + AVGO.
OELGH	Change in gage height (HT - HTO).
OIVS	Defined as: Pondage table: OIVS = (CFSP(I) - CFSP(I-1))/PROP2. Rating table: OIVS = (CFSR(I) - CFSR(I-1))/PROP2.
HTOO	Previous value of HTO (see output).
I	Variable integer for indexing AMHR(I), MHR(I), AKST(I), Q(I), QU(I), KST(I), QTYR(I), QYR(I).
K	Index code having possible values of 0 or 1. K=0: Leap year testing development of time curve, etc. K=1: Bypass above computations.
KNUM	Counter that determines the initialization and temporary storage required during pondage computations.

Symbol	Variable Description
KP	Index code having possible values of 0 or 1. KP=0: Assumes that the pondage correction to be applied to the first discharge rate equals to the pondage correction applied to the second discharge rate. KP=1: Normal procedures for pondage correction apply.
KS	Index code having possible values of 0 or 1. KS=0: Accumulated duration of runoff VOLM(7). KS=1: Accumulated duration of runoff VOLM(7).
KSS	Counter that monitors the progress of the maximum volume search for the selected time intervals VOLM(I) until LEN VOLM(7).
KST(I) I=1,7	The values of NN at the end of each maximum volume search.
KV	Variable integer for indexing R(KV) and T6(KV).
KV3	Index code having possible values of 0 or 1. KV3=0: Proceed with normal maximum volume searching routine. KV3=1: A time increment ≥ to eight days of no runoff has occurred. No maximum volume search made over this interval. All indexes are set to initial conditions, with the exception that maximum volumes that have been determined to the point of no runoff are retained.
L1	Variable integer for indexing PER(L1) from 26-50.
L2	Variable integer for indexing PER(L2) from 51-75.
L3	Variable integer for indexing PER(L3) from 76-100.
L4	Variable integer for indexing PER(L4) from 101-125.
LB	Variable integer for branching instructions. May have values of 1-7.
LEN	Accumulated time (minutes) from the beginning of the maximum volume search.
LINES	A count of the number of lines per page.
LL	TI truncated.
LLL	Time interval in minutes and the upper limit of the maximum volume search loop.
LLLL	VOLM(I) converted to integer form.
LSW	Index code having possible values of 0 or 1. LSW=0: Write column headings for output data and bypass sequential list number. LSW=1: Proceed with normal writing routine.
M(I) I=1,12	Number of days per month.
MHR(I) I=1,12	Accumulated hours by months for the year (time curve).
MM	Lower limit of maximum volume search loop.
MONOO	Previous value of MONTHO (see output).
MTOT	Total number hours per year.
N	A truncated (leap year testing).
NN	Counter that indexes the correct time interval of the trailing edge of the search mesh.
NFLOW	Variable integer used for branching instructions. May have values of 1 or 2. NFLOW=1: Write monthly flow duration summaries. NFLOW=2: Write yearly flow duration summaries.
NRAPBR	Index code having possible values of 1 or 2 (see NTCH). NRAPBR=1: No change of rating or pondage table during the year. NRAPBR=2: Require a new rating and pondage table prior to continuation of data reduction.
POND	Area of pond above gaging station (from pondage table).
PONDO	Previous value of POND.
PROP1	Defined as: Pondage table: PROP1=(HT-GAGP(I-1)) 100. Rating table: PROP1=(HT-GAGR(I-1)) 100.
PROP2	Defined as: Pondage table: PROP2=(GAGP(I)-GAGP(I-1)) 100. Rating table: PROP2=(GAGR(I)-GAGR(I-1)) 100.
PROP3(I) I=1,7	Defined as the runoff per minute for the trailing edge of the search mesh (R(KST)/T6(KST)).
PROP4	Defined aa the runoff per minute for the leading edge of the search mesh (R(KV)/T6(KV)).
Q(I) I=1,25	Accumulated volume of runoff occurring at rates ≥ to FLOW(I) for given month.
QT(I) I=1,25	Accumulated time that runoff occurred at rates ≥ to FLOW(I) for given month.
QTYR(I) I=1,25	Accumulated time that runoff occurred at rates ≥ to FLOW(I) for the year.
QYR(I) I=1,25	Accumulated volume of runoff occurring at rates ≥ to FLOW(I) for the year.
R(KV) KV=1,600	Runoff for time interval (this is a revolving storage area, i.e., when KV=600, storage restarts at KV=1. The maximum volume search is continuous so no overlapping will occur).
RTOT	Accumulated runoff from the beginning of the maximum volume search.
STHR	HR
STHT	HR
STM	MONTHO
STMO	MONTH
STNO	NDAY
STT1	T1
STTI	TI
SUMS	Accumulated runoff to be used in determining the initial value of COMP(I).
T	Defined as: T=MHR(MONTH-1). T=0 when MONTH=1.
T1	Accumulated time from the beginning of the year to the end of TI. Defined as: T1=MHR(MONTH-1)+(NDAY-1) 24 + HR.
T10	Previous value of T1.
T6(KV) KV=1,600	Storage of time intervals in minutes. (This storage area is the counterpart of R(KV)).
TOT	Accumulated time in minutes from the beginning of the maximum volume search.
TOTAL	Accumulated time that runoff occurred during given month.
TOTALQ	Accumulated runoff for month.
TOTYRR	Accumulated runoff for year.
TOTYRQ	Accumulated time that runoff occurred during the year.
TT	Defined as: TT=(NDAY-1)24

APPENDIX LIST C1. -- LISTING OF THE SOURCE STATEMENTS FOR PROGRAM C

```
$FILE           -FTC01,-,U01,U01,DOUBLE,REELS,HIGH,PRINT,BLOCK=160,
$ETC            LRL=15,RCT=09,TYPE3,ERR=RERRX.,EOF=REOFX.,EOR=REORX.,
$ETC            HOLD
$I8FTC FIRST
C     PROGRAM C
C     MISCELLANEOUS HYOROLOGIC OATA REDUCTION PROGRAM
      COMMON/WT/M(12),NOTES(12)/TLD/COUNTS(12),LUSE(12),AREA(15),SLAND(1
     15),PERC(15),ASUB(15)
      REWIND 1
      REWIND 0
   20 READ(5,10)KCONTR
   10 FORMAT(I1)
      CALL CHKPT(30)
      GO TO(1,2,3,4,5),KCONTR                                        (
    1 CALL MOIST
      GO TO 20
    2 CALL LOUSE
      GO TO 20
    3 CALL WINO
      GO TO 20
    4 CALL TEMP
      GO TO 20
    5 STOP
    . ENO
$IBFTC MOIST
C     SUBROUTINE FOR MOISTURE REOUCTION
C
      SUBROUTINE MOIST
      COMMON/WT/M(12),NOTES(12)/TLO/COUNTS(12),LUSE(12),AREA(15),SLANO(1
     15),PERC(15),ASU8(15)
      DIMENSION DP(304,2),SP(112,2),DPN(304,2)
      OIMENSION NSITE(6),NTUBE(3),NO1NO2(7),NOECS(15),NTEMP(7)
      DIMENSION NSNST(6),NTEBE(3),NCHK(3)
      OIMENSION F610(17),OVLP(2),F620(15),F621(16),F624(16),F625(16)
      DIMENSION STDP(4),STDSP(4)
      OATA NOECS/1H0,1H1,1H2,1H3,1H4,1H5,1H6,1H7,1HB,1H9,1HF,1HT,1HI,1HN
     1,1H /
      OATA F610/102H(2I6,I3,I4,1X,6A1,2X,3A1,2X,7A1,
     1               F9.0,F9.1,F11.2,F12.2,4X,A3,I5)      /
      OATA OVLP/12HF7.0  ,1X,A6,/,CHANGE/6H        /
      OATA F620/90H(2I6,I3,I4,7X,14HOEPTH STANOARO,
     1              F9.0,F9.1,27X,A3,I5)      /
      OATA F621/96H(2I6,I3,I4,5X,16HSURFACE STANOARO
     1                      F9.0,F9.1,27X,A3,I5)      /
      DATA F624/96H(2I6,I3,I4,21H     CK DEPTH STANOARD ,
     1                      F9.0,F9.1,27X,A3,I5)      /
      DATA F625/96H(2I6,I3,I4,21H  CK SURFACE STANDARD ,
     1                      F9.0,F9.1,27X,A3,I5)      /
      DATA NCHK/1H.,1H-,1H /
      NCONT=1
      REWINO 1
C
C     LOAD MOISTURE TABLES
C
      NDP=1
  400 JJ=NDP+4
      REAO(5,600)(OP(L,1),UP(L,2),L=NUP,JJ),NENO
  600 FORMAT(10F5.1,25X,I1)
      IF(NEND.EO.9)GO TO 401
      NOP=NOP+5
      GO TO 400
  401 NOPN=1
  402 JJ=NOPN+4
      REAO(5,600)(OPN(L,1),DPN(L,2),L=NOPN,JJ),NENO
      IF(NENO.EO.9)GO TO 403
      NOPN=NDPN+5
      GO TO 402
  403 NSP=1
  404 JJ=NSP+4
      REAO(5,600)(SP(L,1),SP(L,2),L=NSP,JJ),NENO
      IF(NENO.EO.9)GO TO 405
      NSP=NSP+5
      GO TO 404
  405 CONTINUE
    6 L8R=1
      KPAGE=0
      GO TO 90
    5 NUMBFR=1
      NEND=0
   25 SUMC=0.0
      ANUM=0.0
      REAO(5,605)METER,IWD,MO,NO,NYR,(NSITE(I),I=1,6),(NTUBE(I),I=1,3),(
     1NOINO2(I),I=1,7),(COUNTS(I),I=1,5),KODE,NENO,NUP
  605 FORMAT(I1,I4,3I2,1X,6A1,1X,3A1,7A1,5F5.0,10X,I1,5X,I2,A3)
      IF(KOOE.EQ.7)GO TO 220
      IF(KOOE.EO.1)GO TO 8000
 B040 CONTINUE
      OO 30 I=1,5
      IF(COUNTS(I).EO.0.0)GO TO 30
      SUMC=SUMC+COUNTS(I)
      ANUM=ANUM+1.
   30 CONTINUE
      AVG=SUMC/ANUM
      IF(KODE.GT.2)GO TO 1003
      IF(METER.EQ.3.OR.METER.EQ.4)GO TO 1005
 1003 GO TO(40,75,50,55,200,205),KOOE
   40 PCSTD=(AVG/STDP(METER))*100.
 1005 GO TO(301,300,1000,1001),METER
  300 OO 305 I=1,NOPN
      IF(OPN(I,1)-PCSTD)305,365,370
  305 CONTINUE
      I=I-1
  365 PCMOIS=DPN(I,2)
      GO TO 100
  370 J=I-1
      PCMOIS=((PCSTO-OPN(J,I))/(OPN(I,1)-OPN(J,1))*(OPN(I,2)-OPN(J,2)))+
     1DPN(J,2)
      GO TO 100
  301 DO 60 I=1,NDP
      IF(OP(I,1)-PCSTU)60,65,70
   60 CONTINUE
      I=I-I
   65 PCMOIS=DP(I,2)
      GO TO 100
   70 J=I-1
      PCMOIS=((PCSTO-OP(J,1))/(OP(I,1)-OP(J,1))*(OP(I,2)-OP(J,2)))+OP(J,
     12)
  100 CONTINUE
      IF(KODE.EQ.2)GO TO 8000
 B041 CONTINUE
      WRITE(1,610)IWD,MO,ND,NYR,(NSITE(I),I=1,6),(NTEBE(I),I=1,3),(NTEMP
     1(I),I=1,7),(COUNTS(I),I=1,5),SUMC,AVG,PCSTD,PCMOIS,NUP,NCONT
  610 FORMAT(2I6,I3,I4,1X,6A1,2X,3A1,2X,7A1,5F7.0,F9.0,F9.1,F11.2,F12.2,
     18X,A3,I5)
      NCONT=NCONT+1
      NBRANH=1
      LOW=7
      GO TO B99
  912 CONTINUE
      IF(KOOE.EQ.1)GO TO 8052
      DO 8051 I=1,7
 B051 NTEMP(I)=NO1NO2(I)
 B052 CONTINUE
      WRITE(6,F610)IWO,MO,NO,NYR,(NSITE(I),I=1,6),(NTUBE(I),I=1,3),(NTEM
     1P(I),I=1,7),(COUNTS(I),I=1,5),SUMC,AVG,PCSTD,PCMOIS,NUP,NUMBER
      NUMBER=NUM8ER+1
      LBR=2
      GO TO BB
   75 PCSTD=(AVG/STDSP(METER))*100.
      OO BO L=1,NSP
      IF(SP(L,1)-PCSTO)80,81,82
   BO CONTINUE
      L=L-1
   B1 PCMOIS=SP(L,2)
      GO TO 199
   82 J=L-1
      PCMOIS=((PCSTO-SP(J,1))/(SP(L,1)-SP(J,1))*(SP(L,2)-SP(J,2)))+SP(J,
     12)
  199 NTEMP(7)=NDECS(14)
      NTEMP(6)=NOECS(13)
      NTEMP(5)=NDECS(1)
      OO B029 I=1,4
 8029 NTEMP(I)=NDECS(15)
      GO TO 100
   50 STOP(METER)=AVG
      N8RANH=2
      LOW=7
      GO TO B99
  913 CONTINUE
      WRITE(6,F620)IWO,MO,NO,NYR,(COUNTS(I),I=1,5),SUMC,AVG,NUP,NUMBER
      GO TO 54
   55 STDSP(METER)=AVG
      N8RANH=3
      LOW=B
      GO TO 899
  914 CONTINUE
      WRITE(6,F621)IWO,MO,ND,NYR,(COUNTS(I),I=1,5),SUMC,AVG,NUP,NUMBER
   54 NUM8ER=NUMBER+1
      LBR=2
   B8 IF(LINES.GE.51)GO TO 90
      LINES=LINES+1
      GO TO 95
   90 LINES=0
      KPAGE=KPAGE+1
      WRITE(6,615)KPAGE
  615 FORMAT(1H1120X,4HPAGE,I4/38X,55HSOIL MOISTURE OATA-WATERSHEO ENGIN
     1EERING-BLACKSBURG,VA./12BHOWSHO NO. MO OAY YR.  SITE  TUBE   OEPTH
     2                COUNTS                          SUM    AVERAGE  PC STANDARU
     3  PC MOISTURE LIST NO.)
      GO TO(5,95),LBR
  200 N8RANH=4
      LOW=B
      GO TO 899
  915 CONTINUE
      WRITE(6,F624)IWO,MO,NO,NYR,(COUNTS(I),I=1,5),SUMC,AVG,NUP,NUMBER
      GO TO 54
  205 NBRANH=5
      LOW=B
      GO TO B99
  916 CONTINUE
      WRITE(6,F625)IWU,MO,ND,NYR,(COUNTS(I),I=1,5),SUMC,AVG,NUP,NUMBER
      GO TO 54
  220 REAO(5,630)IWD,MO,ND,NYR,(NOTES(I),I=1,9),KOOE,NENO,NUP
  630 FORMAT(1X,I4,3I2,8A6,A5,I1,5X,I2,A3)
      WRITE(6,635)IWD,MO,ND,NYR,(NOTES(I),I=1,9),NUP,NUMBER
  635 FORMAT(2I6,I3,I4,2X,8A6,A5,46X,A3,I5)
      GO TO 54
   95 IF(KOOE.EO.7)GO TO 220
      IF(NENO-9)96,6 99
   96 GO TO(5,25),LBR
   99 REWIND 1
      RETURN
 1000 PCSTD=(AVG/STDP(METER))*100.
      PCMOIS=(PCSTD-7.B)/1.764
      GO TO 100
 1001 PCSTO=(AVG/STDSP(METER))*100.
      PCMOIS=(PCSTO-22.5)/1.60
      GO TO 199
  B99 CONTINUE
      LUP=LOW+4
      ICOUNT=0
      OO 900 I=LOW,LUP
      ICOUNT=ICOUNT+1
      IF(COUNTS(ICOUNT).EO.0.)GO TO 901
      GO TO(902,903,904,905,906),NBRANH
  902 F610(I)=OVLP(1)
      GO TO 900
  903 F620(I)=OVLP(1)
      GO TO 900
  904 F621(I)=OVLP(1)
      GO TO 900
  905 F624(I)=DVLP(1)
      GO TO 900
  906 F625(I)=DVLP(1)
      GO TO 900
  901 COUNTS(ICOUNT)=CHANGE
      GO TO(907,908,909,910,911),NBRANH
  907 F610(I)=OVLP(2)
      GO TO 900
  90B F620(I)=OVLP(2)
      GO TO 900
  909 F621(I)=OVLP(2)
      GO TO 900
  910 F624(I)=DVLP(2)
      GO TO 900
  911 F625(I)=OVLP(2)
  900 CONTINUE
      GO TO(912,913,914,915,916),N8RANH
 8000 CONTINUE
      LK=7
      LM=7
      OO B005 I=1,6
      LI=LK-I
      NSNST(LI)=NOECS(15)
      IF(NSITE(LI).EO.NDECS(15))GO TO 8005
      LM=LM-1
      NSNST(LM)=NSITE(LI)
 8005 CONTINUE
      DO 8006 I=1,6
 8D06 NSITE(II=NSNST(I)
      LM=4
      LK=4
      DO 8010 I=1,3
      LI=LK-I
      NTEBE(LI)=NDECS(15)
      DO 8011 J=1,3
      IF(NTUBE(LI).EO.NCHK(1).OR.NTUBE(L1).EO.NCHK(2).OR.NTUBE(LI).EO.NC
     1HK(3))GO TO 8D11
      LM=LM-1
      NTEBE(LM)=NTUBE(LI)
      GO TO 8010
 8011 CONTINUE
 801D CONTINUE
      IF(KODE.EQ.2IGO TO B041
      LM=B
      LK=B
      DO B020 I=1,7
      LI=LK-I
      NTEMP(LI)=NDECS(15)
      DO 8D1B J=1,14
      IF(ND1ND2(LI),NE,NDECS(J))GO TO 8018
      LM=LM-1
      NTEMP(LM)=NDECS(J)
 BD18 CONTINUE
 B020 CONTINUE
      GO TO BD4D
      END


$1BFTC D1
C     SUBROUTINE FOR LAND USE SUMMARY
C
      SUBROUTINE LDUSF
      COMMON /WT/M(12),IDENT(12)/TLD/WTS(12),LUSE(12),AREA(15),SLAND(15I
     1,PERC(15),ASUB(15)
      REWIND 0
    3 READ(5,510)IDW2,NFN2,(WTS(I),I=1,7),COMP,NEND
  510 FORMAT(14,4X,I3,4X,BF6.4,2X,I2)
      WR1TE(D)1DW2,NFN2,(WTS(I),I=1,7),COMP
      1F(NEND.NE.99)GO TO 3
    1 READ(5,50D)I,AREA(I),NEND
  500 FORMAT(I2,1X,F6.2,69X,I2)
      IF(NEND.NE.9)GO TO 1
      REWIND 0
      KK=0
      KPAGE=1
    4 DO 5 1=1,15
      ASUB(I)=0.
    5 SLAND(I)=0.
      TOT=0.
    B  READ(5,5D5)ID1,ID2,MO,ND,NYR,NFN,(LUSE(I),1=1,7),NEND
  505 FORMAT(5I2,I4,7I2,50X,I2)
      IDWD=ID1*ID0+ID2
      READ(0)IDW2,NFN2,(WTS(I),I=1,7),COMP
      IF(WTS(1).NE.0.D)GO TO 110
      SUM=0.
      DO 105 I=2,7
      IF(WTS(I).EO.0.0)GO TO 111
  105 SUM=SUM+WTS(I)
      GO TO 111
  11D SUM=WTS(1)
  111 IF(SUM.EO.COMP)GO TO 150
      CORR=COMP-SUM
      DO 115 I=1,7
      IF(WTS(I).EO.0.0)GO TO 115
      WTS(1)=(WTS(I)/SUM)*CORR+WTS(1)
  115 CONTINUE
  150 IF(WTS(1).NE.0.0)GO TO 25
      IF(WTS(2I.EO.0.0)GO TO 3D
      DO 20 J=2,7
      IF(LUSE(J).EO.D)GO TO 2D
      JJ=LUSE(JI
      TOT=TOT+WTS(JI
      SLAND(JJ)=SLAND(JJ)+WTS(J)
   20 CONTINUE
      GO TO 30
   25 JJ=LUSE(1I
      SLAND(JJ)=SLAND(JJ)+WTS(1)
      TOT=TOT+WTS(1I
   30 IF(NEND.LT.9)GO TO 8
      ND=-ND
      NYR=-NYR
      IF(KK.EO.D)GO TO 65
      IF(KK.NE.2)GO TO 70
      KK=0
   65 WRITE(6,519)KPAGE
  519 FORMAT(1H1,110X,4HPAGE,I3)
      KPAGE=KPAGE+1
      WRITE(6,520)
  520 FORMAT(1H ,17X,53HLAND USE SUMMARY-WATERSHED ENGINEERING-BLACKSBUR
     1G,VA.)
   70 WRITE(6,53D)IDWD,AREA(ID2),MO,ND,NYR
  530 FORMAT(1H0,5X,9HWATERSHED,I6/6X,10HAREA(ACS.),F8.2/6X,16HDATE SURV
     1EY MADE,3I3)
      KK=KK+1
      DO 6D I=1,15
      PERC(II=(SLAND(I)/TOT)*100.
   60 ASUB(II=(PERC(I)/1DD.)*AREA(ID2)
      WRITE(6,560)
  560 FORMAT(IH0,25X,33HLAND USE(PCT)      LAND USE(ACRES)I
      WRITE(6,57D)(PERC(I),ASUB(I),I=1,15)
  570 FORMAT(6X,14H 1.SMALL GRAIN,7X,F6.2,8X,F11.5/6X,7H 2.CORN,I4X,F6.2
     1,8X,F11.5/6X,6H 3.HAY,15X,F6.2,8X,F11.5/6X,10H 4.PASTURE,11X,F6.2,
     28X,F11.5/6X,1DH 5.TOBACCO,11X,F6.2,8X,F11.5/6X,8H 6.WOODS,13X,F6.2
     3,8X,F11.5/6X,7H 7.IDLE,14X,F6.2,8X,F11.5/6X,8H 8.ROADS,13X,F6.2,8X
     4,F11.5/6X,12H 9.SOY BEANS,9X,F6.2,BX,F11.5/6X,9H10.COTTON,12X,F6.2
     5,8X,F11.5/6X,15H11.SORGHUM CANE,6X,F6.2,8X,F11.5/6X,11H12.FALLOWED
     6,10X,F6.2,BX,F11.5/6X,21H13.                     ,F6.2,8X,F11.5/6X,21
     7H14.                     ,F6.2,BX,F11.5/6X,21H15.                  ,F
     86.2,8X,F11.5)
      CALL CHKPT(30I
      IF(NEND.NE.99)GO TO 4
      RETURN
      END
$I8FTC WIND
C     SUBROUTINE FOR ANEMOMETER DATA REDUCTION
C
      SUBROUTINE WIND
      DIMENSION MM(I2)
      COMMON/W1/M(12),IDENT(12)/TLD/AVMAX(12I,AVMIN(12),C(15),CC(15),AVG
     1(15),CMAX(15)
      DATA MM/31,28,31,3D,31,30,31,31,30,31,3D,31/
   20 READ(5,604)YR,(IDENT(I),I=1,11)
  604 FORMAT(F2.0,11A6I
      READ(5,605)MON,NDAY,HR,TMIN,AMON,KODE,NEND
  605 FORMAT(2I2,1X,2F2.D,2X,F6.1,1X,11,59X,I2)
      LSW=0
      LINES=0
      NUM=1
      AA=YR/4.
      L=AA
      AAA=L
      IF(AA.NE.AAA)GO TO 15
      MM(2)=29
      GO TO 217
   15 MM(2I=28
  217 MTOT=0
      DO 14 1=1,12
      MTOT=MTOT+MM(II*24
   14 M(I)=MTOT
      NYR=-YR
      LBR=1
      GO TO 5
 100D AV=0.
      TI=D.D
      DT=D.D
      LTIME=HR*100.+TMIN
      SD=0.0
      STI=0.0
      SDYR=D.0
      ST1YR=0.D
      MONN=MON
      J=0
      IF(MON.NE.1)GO TO 30
      TTT=0.
      GO TO 40
   30 TTT=M(MON-1)
   4D ANDAY=NDAY
      TT1=(ANDAY-1.)*24.+HR+TMIN/60.
      T1=TTT+TT1
      T2=T1
      NNDAY=-NDAY
      WRITE(6,606)MON,NNDAY,NYR,LTIME,TI,AMON,DT,AV,NUM
      LBR=2
      GO TO 5
   43 NUM=NUM+1
      T1=T2
      AM=AMON
      MONN=MON
      J=0
      READ(5,6D7)MON,NDAY,HR,TMIN,AMON,KODE,NEND
  6D7 FORMAT(2I2,1X,2F2.D,2X,F6.1,1X,I1,59X,I2)
      IF(NEND.GE.9)GO TO 99
   44 IF(MON.NE.1)GO TO 61
      TTT=D.
      GO TO 65
   61 TTT=M(MON-1)
   65 ANDAY=NDAY
      TT2=(ANDAY-1.I*24.+HR+1MIN/60.
      T2=TTT+TT2
      IF(KODE.NE.9)GO TO 85
      NNDAY=-NDAY
      TI=T2-T1
      LTIME=10D.*HR+TMIN
      IF(MONN.NE.MON)GO TO 80
   75 WRITE(6,620)MON,NNDAY,NYR,LTIME,TI,AMON,NUM
  620 FORMAT(1H 3I3,I6,F11.4,F9.1,21H  INSTRUEMENT FAILURE,49X,7X,I5)
      LBR=3
      GO TO 5
 1001 IF(J.EO.0)GO 10 43
      GO TO 82
   B0 LTIME=2400
      NNDAY=-MM(MONN)
      TI=TTT-T1
      J=1
      GO TO 75
   82 J=2
      GO TO 9B
   85 IF(KODE.NE.8)GO TO 88
      D=9999.9-AM
      AM=-D
   88 IF(MONN.NE.MON)GO TO 95
      DT=AMON-AM
      TI=T2-T1
      AV=DT/TI
      LIIME=HR*100.+TMIN
      NNDAY=-NDAY
   93 WRITE(6,606)MON,NNDAY,NYR,LTIME,1I,AMON,DT,AV,NUM
  606 FORMAT(1H 3I3,I6,F11.4,F9.1,F10.1,F9.2,49X,9X,I5)
      LBR=4
      GO TO 5
 10D2 SD=SD+DT
      STI=STI+TI
      IF(J.EQ.DIGO 10 43
      GO TO 98
   95 DD=AMON-AM
      TT=T2-11
      AV=DD/TT
      LTIME=2400
      NNDAY=-MM(MONN)
      1I=TTT-T1
      DT=AV*TI
      J=1
      MCH=MON
      MON=MONN
      GO TO 93
   98 NUM=NUM+1
   99 SDYR=SDYR+SD
      STIYR=STIYR+STI
      AVM=SD/STI
      WRITE(6,610)STI,SD,AVM,NUM
  610 FORMAT(49X,6X,F11.4,F9.1,F8.2,3DX,I5)
      LBR=5
      GO TO 5
 1003 IF(NEND.GE.9)GO TO 115
      SD=D.
      STI=0.0
      MON=MCH
      IF(J.EQ.2)GO 10 108
      TI=T2-TT1
      LTIME=100.*HR+IMIN
      DT=AV*TI
      NNDAY=-NDAY
      NUM=NUM+1
      J=0
      GO TO 93
  108 NNDAY=-NDAY
      LTIME=100.*HR+TMIN
      I1=I2-III
      NUM=NUM+1
      J=0
      GO TO 75
  115 NUM=NUM+1
      AVYR=SDYR/STIYR
      WRITE(6,611)STIYR,SDYR,AVYR,NUM
  611 FORMAT(49X,34X,F12.4,F8.1,F8.2,2X,I5)
      NUM=1
      IF(NENO.EO.9)GO TO 20
      RETURN
    5 IF(LSW.NE.0)GO TO 6
      LSW=1
      GO TO 8
    6 LINES=LINES+1
      IF(LINES.LT.58)GO TO 7
    8 WRITE(6,621)(IDENT(I),I=1,11)
  621 FORMAT(1H111A6)
      WRITE(6,300)
  300 FORMAT(1H028X,60HANEMOMETER COMPUTATIONS-WATERSHEO ENGINEERING-8LA
     1CKSBURG,VA./118H0  DATE      TIME     TIME     ANEMOMETER  DIST TRV A
     2VG RATE TIME INTV OIST TRV AVG RATE TIME INTV OIST TRV AVG RATE SE
     30./117H  MO OA YR          INTV(HRS) DIST(MILES) FOR INTV  (MPH)
     4 MONTH      MONTH    MONTH       YEAR       YEAR        YEAR       NO)
      LINES=4
    7 GO TO(1000,43,1001,1002,1003),L8R
      ENO
$I8FTC TEMP
C     SU8ROUTINE FOR MAX-MIN TEMPERATURE REOUCTIONS
C
      SU8ROUTINE TEMP
      OIMENSION AMAX(12,31),AMIN(12,31),IMAX(10,12),IMIN(10,12)
      OIMENSION MM(12),FOR(14),FORR(2)
      COMMON/WT/CMIN(12),IO(12)/TLO/AVMAX(12),AVMIN(12),C(15),CC(15),AVG
     1(15),CMAX(15)
      OATA MM/31,28,31,30,31,30,31,31,30,31,30,31/
      DATA FORR/12HA6    ,I6    ,/,NFO/6H      /
      OATA FOR/79H(27X ,I6    ,I6    ,I6    ,I6    ,I6    ,I6    ,I6    ,I6
     1I6    ,I6    ,I6    ,I6    ,)/
  700 DO 403 I=1,12
      OO 400 J=1,31
      AMIN(I,J)=0.0
  400 AMAX(I,J)=0.0
  403 CONTINUE
      DO 401 I=1,12
      C(I)=0.
  401 CC(I)=0.
      OO 405 I=1,10
      DO 402 J=1,12
      IMAX(I,J)=0
  402 IMIN(I,J)=0
  405 CONTINUE
      KKKK=1
      REAO(5,107)YR,(IO(I),I=1,11)
  107 FORMAT(F2.0,11A6)
      NNYR=YR+1900.
      AA=YR/4.
      L=AA
      AAA=L
      IF(AA.NE.AAA)GO TO 15
      MM(2)=29
      LEAP=2
      GO TO 370
   15 MM(2)=28
      LEAP=1
  370 REAO(5,110)MO,NO,AMAX(MO,ND),AMIN(MO,NO),NENO
  110 FORMAT(2I2,2(1X,F3.0),66X,I2)
      IF(NEND.LT.9)GO TO 370
      LL=1
      L=1
      DO 350 I=1,12
      II=MM(I)
      AII=II
      COMP1=AMAX(I,1)
      COMP2=AMIN(I,1)
      DO 330 J=1,II
      IF(AMAX(I,J).GT.COMP1)COMP1=AMAX(I,J)
      IF(AMIN(I,J).LT.COMP2)COMP2=AMIN(I,J)
      C(I)=C(I)+AMAX(I,J)
  330 CC(I)=CC(I)+AMIN(I,J)
      AVMAX(I)=C(I)/AII+.05
      AVMIN(I)=CC(I)/AII+.05
      CMAX(I)=COMP1
      CMIN(I)=COMP2
  350 AVG(I)=(CMAX(I)+CMIN(I))/2.
      OO 361 I=1,12
      II=MM(I)
      OO 360 J=1,II
      IF(CMAX(I).NE.AMAX(I,J))GO TO 362
      IMAX(L,I)=J
      L=L+1
  362 IF(CMIN(I).NE.AMIN(I,J))GO TO 360
      IMIN(LL,I)=J
      LL=LL+I
  360 CONTINUE
      L=1
  361 LL=I
  699 WRITE(6,906)(ID(I),I=1,11),NNYR
  906 FORMAT(1H111A6/5H YEAR,I6)
      GO TO(800,801),KKKK
  800 WRITE(6,903)
  903 FORMAT(1H 24X,77HMAXIMUM-MINIMUM TEMPERATURE COMPUTATIONS-WATERSHE
     1D ENGINEERING-8LACKSBURG,VA./1H053X,8HMAXIMUMS/25X,76HDATE   JAN.
     2FE8.  MAR.  APR.  MAY    JUNE   JULY  AUG. SEPT.  OCT.  NOV.  OEC.)
      GO TO 802
  801 WRITE(6,904)
  904 FORMAT(1H 24X,77HMAXIMUM-MINIMUM TEMPERATURE COMPUTATIONS-WATERSHE
     1O ENGINEERING-BLACKSBURG,VA./1H053X,8HMINIMUMS/25X,76HOATE   JAN.
     2FE8.  MAR.  APR.  MAY    JUNE   JULY  AUG. SEPT.  OCT.  NOV.  OEC.)
  802 LIM=MM(2)
      DO 501 I=1,LIM
      GO TO(500,803),KKKK
  803 WRITE(6,210)I,(AMIN(J,I),J=1,12)
  210 FORMAT(25X,I3,1X,12F6.1)
      GO TO 501
  500 WRITE(6,210)I,(AMAX(J,I),J=1,12)
  501 CONTINUE
      GO TO(505,515),LEAP
  505 DO 511 I=29,30
      GO TO(510,804),KKKK
  804 WRITE(6,201)I,AMIN(1,I),(AMIN(J,I),J=3,12)
  201 FORMAT(25X,I3,1X,F6.1,6X,10F6.1)
      GO TO 511
  510 WRITE(6,201)I,AMAX(1,I),(AMAX(J,I),J=3,12)
  511 CONTINUE
      GO TO 520
  515 I=30
      GO TO(806,805),KKKK
  805 WRITE(6,201)I,AMIN(1,1),(AMIN(J,I),J=3,12)
      GO TO 520
  806 WRITE(6,201)I,AMAX(1,1),(AMAX(J,I),J=3,12)
  520 I=31
      GO TO(809,808),KKKK
  808 WRITE(6,202)I,(AMIN(J,I),J=1,7,2),(AMIN(J,I),J=8,12,2)
  202 FORMAT(25X,I3,1X,F6.1,3(6X,F6.1),F6.1,2(6X,F6.1))
      GO TO 810
  809 WRITE(6,202)I,(AMAX(J,I),J=1,7,2),(AMAX(J,I),J=8,12,2)
  810 GO TO(812,811),KKKK
  811 WRITE(6,103)(AVMIN(I),I=1,12)
  103 FORMAT(21H   AVERAGE OF MINIMUM,8X,12F6.1)
      WRITE(6,104)(CMIN(I),I=1,12)
  104 FORMAT(10H   MINIMUM,19X,12F6.1)
      GO TO 813
  812 WRITE(6,203)(AVMAX(I),I=1,12)
  203 FORMAT(10H   AVERAGE,19X,12F6.1)
      WRITE(6,204)(CMAX(I),I=1,12)
  204 FORMAT(10H   MAXIMUM,19X,12F6.1)
  813 WRITE(6,205)(AVG(I),I=1,12)
  205 FORMAT(21H   AVERAGE OF MAXIMUM,8X,12F6.1)
      KK=0
      KKK=0
      OO 519 J=1,10
      IF(KK.GT.KKK)GO TO 999
      GO TO(125,120),KKKK
  120 WRITE(6,106)(IMIN(J,I),I=1,12)
  106 FORMAT(25H   DAYS MINIMUMS OCCURRED,4X,I4,11I6)
      GO TO 126
  125 WRITE(6,206)(IMAX(J,I),I=1,12)
  206 FORMAT(25H   OAYS MAXIMUMS OCCURREO,4X,I4,11I6)
  126 KK=1
      GO TO 519
  999 GO TO(1000,1001),KKKK
 1001 DO 2000 I=1,12
      IF(IMIN(J,I).NE.0)GO TO 1999
      FOR(I+1)=FORR(1)
      IMIN(J,I)=NFO
      GO TO 2000
 1999 FOR(I+1)=FORR(2)
 2000 CONTINUE
      WRITE(6,FOR)(IMIN(J,I),I=1,12)
      GO TO 519
 1000 DO 2005 I=1,12
      IF(IMAX(J,I).NE.0)GO TO 2004
      FOR(I+1)=FORR(1)
      IMAX(J,I)=NFO
      GO TO 2005
 2004 FOR(I+1)=FORR(2)
 2005 CONTINUE
      WRITE(6,FOR)(IMAX(J,I),I=1,12)
  519 CONTINUE
      KKKK=KKKK+1
      IF(KKKK.EQ.2)GO TO 699
      IF(NEND.EQ.9)GO TO 700
      RETURN
      END
```

APPENDIX LIST C2. -- DETAILED DESCRIPTION OF THE VARIABLES USED IN PROGRAM C

Calling Routine

Symbol	Description
KCDNTR	One digit integer having possible values of 1, 2, 3, 4, 5.
LDUSE	Subroutine for land use summaries.
MOIST	Subroutine for soil moisture reduction.
TEMP	Subroutine for max-min temperature summary.
WIND	Subroutine for anemometer reduction.

Subroutine Moist

Input

COUNTS(I) I=1,5	Number of counts obtained by scaler.
DP(L,I) L=1,304 I=1,2	Coordinate points from the calibration curve for depth probe No. 1 I = 1: Percent standard. I = 2: Percent moisture.
DPN(L,I) L=1,304 I=1,2	Coordinate points from the calibration curve for depth probe No. 2 I = 1: Percent standard. I = 2: Percent moisture.
I	Variable integer used to index COUNTS(I), ND1ND2(I), NOTES(I), NSITE(I), and NTUBE(I). The variable I that is given as indexes for DP(L,I), DPN(L,I), and SP(L,I) is a dummy variable that is used to indicate the second dimension of the respective matrices.
IWD	Watershed identification code.
JJ	Variable integer used to identify the upper limit of read loop.
KODE	Variable index code used in branching instructions. See bottom of table C1.
L	Variable integer used to index DP(L,I), DPN(L,I), and SP (L,I).
METER	Index code having possible values of 1, 2, 3, or 4. METER = 1: Depth probe No. 1. METER = 2: Depth probe No. 2. METER = 3: Depth probe No. 3. METER = 4: Surface probe No. 2
MO	Two digit integer representing the month of the year.
ND	Two digit integer representing the day of the month.
ND1ND2(I) I=1,7	Depth at which reading was taken, e.g., surface, 12 IN., 24 IN., etc. The depth field is read as 7 one-digit alphameric words.
NDP	Index code that locates the lower limit of the read loop for table DP(L,I).
NDPN	Index code that locates the lower limit of the read loop for table DPN(L,I).
NEND	Index code that initiates specific logical operations. When loading the soil moisture tables (DP(L,I), DPN(L,I), and SP(L,I)) this code specifies when the respective tables have been completely loaded. For this function NEND is used as follows: NEND = 0: More cards to be loaded. NEND = 9: The table has been loaded NEND is also used in conjunction with the basic input data and has the following function: NEND = 0 or (blank): Normal processing which implies that there will be more data to follow. NEND = 9: End of intermediate station record. This implies that 2 or more station records are being processed. NEND = 99: Terminates all processing after the last data card (the one containing the 99) has been processed.
NOTES (I) I=1,9	Notes explaining weather conditions, sampling conditions, etc. (See sample input data table C1.)
NSITE(I) I=1,6	Sampling site identification number(s) or letter(s) or both. The site identification is read as a 6 one-digit alphameric word.
NSP	Index code that locates the lower limit of the read loop for table SP(L,I).
NTUBE(I) I=1,3	Moisture tube identification, e.g., A, B, C, D, 1, 2, etc. The tube identification field is read as 3 one-digit alphameric words.
NUP	Update identification code.
NYR	Two-digit integer representing the last two digits of year.
SP(L,I) L=1,112 I=1,2	Coordinate points from the calibration curve for the surface moisture meter.

Output

AVG	Average counts per minute.
COUNTS(I) I=1,5	See Input.
I	See Input.
IWD	See Input.
KPAGE	Sequential page number.
MO	See Input.
NCONT	Sequential list for data output via S.SUD1.
ND	See Input.
NOTES(I) I=1,9	See Input.
NSITE(I) I=1,6	See Input.
NTEBE(I) I=1,3	See NTUBE(I) in the Input section.
NTEMP(I) I=1,7	See ND1ND2(I) in the Input section.
NUMBER	Sequential list number for data output via S.SU06
NUP	See Input.
NYR	See Input.
PCMOIS	Percent moisture by volume.
PCSTD	Percent standard.
SUMC	Accumulated sum of the counts made at a given setting, e.g., the sum of three one-minute readings.

PROGRAM

(Input/output variables are not included)

ANUM	Number of one-minute counts made at a given setting.
CHANGE,	A six-digit blank alphameric data field that is used to replace zeros in the COUNT(I) vector. The result of this replacement is that blank spaces in place of zeros will appear under the heading counts (table C2a).
DULP(I) I=1,2	To six-digit alphameric data fields that are used to develop output formats.
F610(I) I=1,17	Variable output format.
F620(I) I=1,15	Variable output format.
F621(I) I=1,16	Variable output format.
F624(I) I=1,16	Variable output format.
F625(I) I=1,16	Variable output format.
I	Variable index.
ICOUNT	Variable index.
J	Variable index.
JJ	Variable index.
L	Variable index.
LBR	Variable index used in branching instructions.
LI	Variable index.
LINES	Count of number of lines written per page.
LK	Variable index.
LM	Variable index.
LOW	Lower limit of do loop for building format statement.
LUP	Upper limit of do loop for building format statement.
NBRANH	Variable index used in branching instructions.

APPENDIX LIST C2. -- CONTINUED

PROGRAM

(Input/output variables are not included)

Symbol	Description
NCHK(I) I=1,3	Three one-digit alphameric data fields. These three are ., -, and blank sp.
NDECS(I) I=1,15	All data in input vectors ND1ND2(I), NSITE(I), and NTUBE(I) must be right justified prior to writing on storage tape (S.SU01). The alphameric characters stored in vector NDECS(I) are the only valid ones allowed on the permanent storage output tape (S.SU01).
NSNST(I) I=1,6	Temporary storage for NSITE(I)
STDR(I) I=1,4	Standard count for depth probes.
STDSP(I) I=1,4	Standard count for surface probes.

SUBROUTINE LDUSE

Input

Symbol	Description
AREA(I) I=1,15	Watershed areas (acres).
COMP	Base weight for given field. Equivalent to the total field weight when the first field weight table is formulated.
I	Variable integer used to index AREA(I), WTS(I) and LUSE(I).
ID1	The first two digits of the watershed identification code.
ID2	Last two digits of the watershed identification code. This variable is also used to index AREA(ID2).
IDW2	Watershed identification from the field weight table.
LUSE(I) I=1,7	Coding for land use. See the key at the bottom of Table C4.
MO	Two digit integer representing the month of the year.
ND	Two digit integer representing the day of the year.
NEND	Index code used to specify the end of a station record. NEND = 0 or (blank): Normal processing. NEND = 9: End of land use data for given station. NEND = 99: End of field weight table and terminates processing of land use data.
NFN	Field number (land use data).
NFN2	Field number (field weight table).
NYR	Last two digits of the year, e.g., 66 for 1966.
WTS(I) I=1,7	Land use is measured by weight. The area covered by a given land use is plotted on the watershed map and cut out and weighed. The weights for each land use represented in a given field must be determined. WTS(I) represents the above weights. The sum of the WTS(I) weights must equal the base weight. If not, each individual WTS(I) is corrected by the program by the product ratio: (WTS(I)/SUM)CORR where I=2,7.

Output

Symbol	Description
AREA(ID2) ID2=1,15	See Input.
ASUB(I) I=1,15	Total area in given land use (acres).
COMP) IDW2) NFN2) WTS(I)) I=1,7)	See Input (field weight table place on auxiliary tape to be used in processing land use data).
I	Variable integer used to index ASUM(I), WTS(I) and PERC(I).
IDWD	Watershed identification number.
KPAGE	Page number.
ID2	See Input.
MO	See Input.
ND	See Input.
NYR	See Input.
PERC(I) I=1,15	The percentage of the total area of a given watershed in a particular land use.

PROGRAM

(Input/output variables are not included)

Symbol	Description
CHKPT(30)	Library subroutine that allows restarting of the program at some 30-minute break point, in the event machine failure occurs during processing.
CORR	Total correction to be prorated among field weights WTS(2)--WTS(7). These are subdivisions of the main field.
J	Variable integer used to index LUSE(J) and WTS(J).
JJ	Variable integer used to index SLAND(JJ).
KK	Variable integer used in branching instructions.
SLAND(I) I=1,15	The accumulated sum of the field weights for the respective land uses given at the bottom of Table C4.
SUM	Accumulated sum of the weights for given field subdivisions.
TOT	Total weight for the watershed being studied. Equivalent to the sum of the field weights.

SUBROUTINE WIND

Input

Symbol	Description
AMDN	Total wind distance (miles).
HR	First two digits of time of day that reading (AMDN) was made (military time). Equivalent to hours.
I	Variable integer used to index IDENT(I).
IDENT(I) I=1,11	Location and station identification, e.g., CRAB CREEK, BLACKSBURG, VIRGINIA.
KODE	Variable index code that identifies the type of input. KODE = 0 or (blank): Normal input. KODE = 8: Recording scale reversal. KODE = 9: Instrument failure.
MON	Two digit integer representing the month of the year.
NDAY	Two digit integer representing the day of the month.
NEND	Variable index code used to terminate processing. NEND = 0 or (blank): Normal processing. NEND = 9: End of station record. Processing continues with the next station. NEND = 99: Terminates all anemometer data processing.
TMIN	Last two digits of the time of day that anemometer reading was made. Equivalent to minutes.
YR	Last two digits of year, e.g., 66 refers to 1966.

Output

Symbol	Description
AMDN	See Input.
AV	Average wind speed during time interval TI (miles/hr.).
AVM	Average wind speed for the month (miles/hr.).
AVYR	Average wind speed for the year (miles/hr.).
DT	Total distance traveled (miles) during time interval TI.
I	Variable integer used for indexing IDENT(I).
IDENT(I) I=1,11	See Input.
LTIME	Time of day that anemometer reading was made (military time).
MON	See Input.
NNDAY	(-) NDAY.
NUM	Sequential list number.
NYR	Year.
SD	Total distance traveled (miles) during the month.
SDYR	Total distance traveled (miles) during the year.
STI	Accumulated time in hours for month.
STIYR	Accumulated time in hours for year.
TI	Time interval between two respective anemometer readings in hours.

PROGRAM

(Input/Output Variables are not Included)

Symbol	Description
AA	Defined as: AA = YR/4.
AAA	Integer form of AA.
AM	Previous value of AMDN (See Input section).
ANDAY	NDay converted to floating point arithmetic.
D	Defined as: D = 9999.9-AM.
DD	Defined as: DD = AMDN-AM.
I	Variable integer used to index M(I), MM(I).
J	Variable index used in branching instructions.
L	AA converted to integer form.

APPENDIX LIST C2. -- CONTINUED

Symbol	Description
LBR	Variable index used in multiple branch instruction.
LINES	A count of the number of lines to be printed per page.
LSW	Index code having possible values of 0 or 1. LSW = 0: Data column heading are written for the first output sheet. LSW = 1: Normal processing continues.
M(I) I=1,12	Accumulated hours by month for the year (time curve).
MCH	Temporary storage of MON.
MM(I) I=1,12	Number of days per month.
MONN	Previous value of MON.
MTOT	Accumulated sum of the hours per year.
T1	Previous value of T2.
T2	Defined as: T2 = TTT + TT2.
TT	Defined as the time interval when two consecutive observations are in different months.
TT1	Defined as: TT2 = (ANDAY - 1) 24 + TMIN/60.
TT2	Same as TT1.
TTT	Accumulated hours to the end of the previous month. Defined as: TTT = M(MON-1)

SUBROUTINE TEMP

Input

Symbol	Description
AMAX(MO,ND) MO=1,12 ND=1,31	Storage area for maximum daily temperature.
AMIN(MO,ND) MO=1,12 ND=1,31	Storage area for minimum daily temperatures.
I	Variable integer used for indexing ID(I).
ID(I) I=1,11	Location and station identification, e.g, MOOREFIELD, W. VA.
MO	Two digit integer representing the month of the year and also used to index AMAX(MO,ND) and AMIN(MO,ND).
ND	Two digit integer representing the day of month and used to index AMAX(MO,ND) and AMIN(MO,ND).
NEND	Index code used to terminate processing. NEND = 0 or (blank): Normal processing. NEND = 9: Terminates input summarized data and proceeds to next station record. NEND = 99: Terminates input summarized data and then terminates all max-min temperature reduction.
YR	Two digit integer representing the last two digits of the year.

Output

Symbol	Description
AMAX(J,I) J=1,12 I=1,31	See Input.
AMIN(J,I) J=1,12 I=1,31	See Input.
AVG(I) I=1,12	Average of the maximum and minimum temperature for month I.
AVMAX(I) I=1,12	Average maximum temperature for month I.
AVMIN(I) I=1,12	Average minimum temperature for month I.
CMAX(I) I=1,12	Maximum temperature for month I
CMIN(I) I=1,12	Minimum temperature for month I.
I	Variable integer used to index AMAX(J,I), AMIN(J,I), AVMAX(J), AVMIN(J), AVG(I), CMAX(I), CMIN(I), IMAX(J,I), IMIN(J,I) and ID(I).
IMAX(J,I) J=1,10 I=1,12	Date(s) of occurrence of the maximum monthly temperature.
IMIN(J,I) J=1,10 I=1,12	Date(s) of occurrence of the minimum monthly temperature.
J	Variable integer used to index AMAX(J,I), AMIN(J,I), IMAX(J,I) and IMIN(J,I).
NNYR	Year - defined as: NNYR = YR + 1900.

PROGRAM

(Input/output Variables not Included)

Symbol	Description
AA	Defined as AA = YR/4.
AAA	Integer form of AA.
AII	Number of days in Month I (I=1,12).
C(I) I=1,12	Accumulated sum of maximum temperatures for month I.
CC(I) I=1,12	Accumulated sum of minimum temperatures for month I.
COMP1	Maximum monthly temperature.
COMP2	Minimum monthly temperature.
I	Variable integer used to index C(I), CC(I), AMAX(I,J), AMIN(I,J), IMAX(I,J), IMIN(I,J), MM(I), CMAX(I) and CMIN(I).
II	Upper limit of search loop. Equivalent to MM(I).
J	Variable integer used to index AMAX(I,J), AMIN(I,J), IMAX(I,J) and IMIN(I,J).
KK	Index code.
KKK	Index code equal to 0 used in branch instruction.
KKKK	Index code having possible values of 1 or 2 used for branching instructions.
L	Variable integer used to index IMAX(L,I).
LEAP	Index code having possible values of 1 or 2 used in branching instruction.
LIM	Upper limit of write loop. Equivalent to the number of days in February.
LL	Variable integer used to index IMIN(LL,I).
MM(I) I=1,12	Number of days in month I.

APPENDIX LIST D1. -- LISTING OF THE SOURCE STATEMENTS FOR PROGRAM D

```
$FILE           -FTC00.-,U00,UU0,DOUBLE,REELS,HIGH,PRINT,BLOCK=160,
$ETC            LRL=15,RCT=09,TYPE3,ERR=RERRX.,EOF=REOFX.,EOR=REORX.,
$ETC            HOLD
$FILE           -FTC02.-,U02,U02,OOUBLE,REEL,PRINT,BLOCK=160,
$ETC            LRL=15,RCT=10,TYPE3,ERR=RERRX.,EOF=REOFX.,EOR=REORX.,
$ETC            MOUNT1
$FILE           -FTC01.-,U01,U01,OOUBLE,REELS,HIGH,PRINT,BLOCK=160,
$ETC            LRL=15,RCT=09,TYPE3,ERR=RERRX.,EOF=REOFX.,EOR=REORX.,
$ETC            MOUNT1
$IBFTC UPOATE
C     PROGRAM D****UPDATE
      DIMENSION L(22)
      INTEGER UPB1,UPB2,UPE1,UPE2,UPCODE,UPC1,UPC2,UPC3,UPC4
      OATA NCHECK/3H   /
      KK=0
      REWINO 0
      REWINO 1
      REWINO 2
      NTAPE1=0
      NTAPE2=0
   10 REAO(5,700)UPB1,UP82,UPE1,UPE2,UPCOOE,NUMBER,INCR,NFL,NFOR,NEND,NC
  700 FORMAT(2(A3,I5),A3,I4,I2,4I1)
      K=0
      IF(NTAPE1.EQ.NFL)GO TO 12
      IF(NTAPE2.NE.NFL)GO TO 15
      NTAPE2=0
      REWINO 2
      GO TO 15
   12 NTAPE1=0
      REWINO 1
   15 GO TO(20,30,40,200),NFOR
   20 GO TO(25,26,27),NFL
   25 REAO(1,711)(L(I),I=1,14),UPC1,UPC2
  711 FORMAT(13A6,A4,A3,I5)
      GO TO 50
   26 REAO(2,711)(L(I),I=1,14),UPC1,UPC2
      GO TO 50
   27 READ(5,715)(L(I),I=1,14),UPC1,UPC2
  715 FORMAT(13A6/A4,A3,I5)
      GO TO 50
   30 GO TO(31,32,33),NFL
   31 REAO(1,721)(L(I),I=1,22),UPC1,UPC2
  721 FORMAT(13A6,A1,7A6,A2,A3,I5)
      GO TO 50
   32 READ(2,721)(L(I),I=1,22),UPC1,UPC2
      GO TO 50
   33 REAO(5,725)(L(I),I=1,22),UPC1,UPC2
  725 FORMAT(13A6,A1/7A6,A2,A3,I5)
      GO TO 50
  200 GO TO(201,202,203),NFL
  201 REAO(1,210)(L(I),I=1,22),UPC1,UPC2
  210 FORMAT(13A6,A2,7A6,A2,A3,I5)
      GO TO 50
  202 REAO(2,210)(L(I),I=1,22),UPC1,UPC2
      GO TO 50
  203 REAO(5,211)(L(I),I=1,22),UPC1,UPC2,
  211 FORMAT(13A6,A2/7A6,A2,A3,I5)
      GO TO 50
   40 GO TO(41,42,43),NFL
   41 READ(1,730)(L(I),I=1,12),UPC1,UPC2
  730 FORMAT(12A6,A3,I5)
      GO TO 50
   42 REAO(2,730)(L(I),I=1,12),UPC1,UPC2
      GO TO 50
   43 REAO(5,730)(L(I),I=1,12),UPC1,UPC2
   50 IF(UPC1.EO.UPB1.AND.UPC2.FO.UPB2)K=1
      UPC3=UPC1
      UPC4=UPC2
      KK=KK+1
      IF(KK.LT.1000)GO TO 55
      KK=0
      CALL CHKPT(30)
   55 IF(K.EO.0)GO TO(20,30,40,200),NFOR
      IF(UPCOOE.NE.NCHECK)UPC1=UPCOOE
      IF(NC.EO.0.OR.NC.EO.7)GO TO 56
      UPC2=LASNUM+INCR
      GO TO 58
   56 IF(NUMBER.NE.0)UPC2=NUMBER
   58 CONTINUE
      GO TO(60,61,62,204),NFOR
   60 WRITE(0,711)(L(I),I=1,14),UPC1,UPC2
      GO TO 65
   61 WRITE(0,721)(L(I),I=1,22),UPC1,UPC2
      GO TO 65
   62 WRITE(0,730)(L(I),I=1,12),UPC1,UPC2
      GO TO 65
  204 WRITE(0,210)(L(I),I=1,22),UPC1,UPC2
   65 LASNUM=UPC2
      IF((NC.EO.1.OR.NC.EO.2).OR.NUMBER.EO.0)GO TO 100
      NUMBER=NUMBER+INCR
  100 IF(UPC3.EO.UPE1.AND.UPC4.EO.UPE2)GO TO 101
      GO TO 15
  101 IF(NENO.EO.9)GO TO 70
      IF(NC.EO.2.OR.NC.EO.7)GO TO 75
   64 IF(NENO.NE.8)GO TO 10
      GO TO(66,67),NFL
   66 NTAPE1=1
      REWINO 1
      PAUSE 1
      GO TO 10
   67 NTAPE2=2
      REWIND 2
      PAUSE 2
      GO TO 10
   75 REWINO 0
      PAUSE 0
      GO TO 64
   70 REWINO 0
      CALL EXIT
      ENO
```

APPENDIX LIST D2. -- DETAILED DESCRIPTION OF THE VARIABLES USED IN PROGRAM D

DESCRIPTION OF VARIABLES

Input

Symbol	Description
I	Variable integer for indexing L(I).
INCR	The sequencing interval (e.g., 1 if consecutive numbers are desired).
L(I) I=1,22	The storage area for input data (data being updated which includes correstions, merging or rewriting). The data are stored in alphameric mode with a maximum field width of 6 digits.
NC	Variable index code specifying when continuous sequencing is required, and when the corrected tape (S.SU00) is to be removed and a new tape loaded. NC = 0 : Normal output continues and all changes that are required in the sequence number are controlled by NUMBER and INCR. NC = 1: Continuous sequencing is accomplished by adding INCR to the last value written on tape 00. NC = 2: This code allows for the same sequencing procedure as when NC = 1, but it also allows for rewind of tape 00 and the loading of a new tape. NC = 7: Rewind and remove tape. Load a new output tape. The sequencing procedure is the same as when NC = 0.
NEND	Variable index code used to terminate processing or indicate tape rewind. NEND = 0: Normal processing. NEND = 8: The tape being read is rewound. The computer pauses to allow loading of the next input tape. NEND = 9: Terminates all processing.
NFL	Variable index used to specify the utility unit or tape drive from which the input data are to be read. NFL = 1: Data on S.SU01. NFL = 2: Data on S.SU02. NFL = 3: Data on S.SU05 (cards).
NFOR	Variable index used to specify the input data format. NFOR = 1: Precipitation data (90-character records in the form of a 90-column card image). NFOR = 2: Runoff data (131-character records in the form of a 131-column card image). NFOR = 3: 80-character records (80-column card images). NFOR = 4: Soil moisture data (132-character records in the form of a 132-column card image).
NUMBER	Beginning sequence number for the corrected output tape if different from input.
UPB1	Beginning update code of data to be written on the corrected output tape (S.SU00).
UPB2	Beginning sequence number of the data to be written on the corrected output tape (S.SU00).
UPCODE	Update code of data to be written on the corrected output tape if different from input.
UPC1	Update code from input data.
UPC2	Sequence number from input data.
UPE1	Ending update code for the data to be written on the corrected output tape.
UPE2	Ending sequence number for the data to be written on the corrected output tape.

Output

I	See Input.
L(I) I=1,22	See Input.
UPC1	See Input.
UPC2	See Input.

Program

(Input/output variables are not included)

CHKPT(30)	Library subroutine for IBM 7040. Information is written on S.SU03 every 30 minutes to allow restart of the program in the event that machine failure occurs.
K	Output routine for this program consists of writing from input units S.SU01, S.SU02 or S.SU05 onto S.SU00. K is an integer index that specifies when data is to be transferred from the input media to the output media. K = 0: Data not transferred (no output). K = 1: Data are transferred.
KK	Variable integer used to determine when to call CHKPT(30).
LASNUM	Previous sequence number
NCHECK	A variable used to determine if a new update code is required for the correction tape. NCHECK is retained in storage as 3 blank characters.
NTAPE1	Variable index used to specify a rewind of S.SU01. NTAPE1 = 0: No rewind. NTAPE1 = 1: Beginning of a new tape; rewind to assure that reading begins at the start of the tape.
NTAPE2	Variable index used to specify a rewind of S.SU02. NTAPE2 = 0: No rewind. NTAPE2 = 1: Rewind.
UPC3	Temporary storage for UPC1.
UPC4	Temporary storage for UPC2.

APPENDIX LIST E1. -- LISTING OF THE SOURCE STATEMENTS FOR PROGRAM E

```
$IBJOB          MAP,NDSOURCE
$FILE           -FTC00.-,U00,U00,DOUBLE,REEL,PRINT,BLOCK=160,
$ETC            LRL=15,RCT=10,TYPE3,ERR=RERRX.,EDF=REOFX.,EOR=REORX.,
$ETC            MOUNT1
$FILE           -FTC0I.-,U01,U01,DOUBLE,REEL,PRINT,BLOCK=160,
$ETC            LRL=15,RCT=10,TYPE3,ERR=RERRX.,EOF=REOFX.,EOR=REORX.,
$ETC            MOUNT1
$IBFTC BLK
C     PROGRAM E
C     PROGRAM FDR COMPILING ARS MISCELLANEOUS PUBLICATION INFORMATION
      DIMENSION ARUN(12,33),ARAIN(12,33),P(12,33),CTABLE(12,33),NTMAX(12
     1,33),NTMIN(12,33),KD(12,33),PYRSP(12),YRSREC(12),AREA(15),RA(15),M
     2(12),NBLK(4),NUMB(B),NCODE(3),NT(132,6),MATC(32,4),NTYPE(B),TWTS(6
     3),AMEAN(12),AVMX(12),AVMN(12)
C
      EQUIVALENCE (NTMAX(1,1),CTABLE(1,I),ARUN(1,1)),(P(1,1),NTMIN(1,I),
     1ARAIN(I,1)),(AVMX(1),PYRSP(1)),(AVMN(1),YRSREC(1))
C     PROGRAM CONSTANTS
C
      DATA NTYPE/1H ,1HT,1HE,1HS,1HL,1HH,1HN,1HM/
      DATA NBLK/6H      ,6H      ,6H      ,5H     /
      DATA M/31,2B,31,30,31,30,31,3I,30,31,30,31/
      DATA NUMB/111,222,122,112,212,221,121,211/
C
      INTEGER ANTA,ANTN,RBA,RBN,REA,REN,QANTA,OANTN,QBA,QBN,QEA,QEN,CORT
     1,COUNT,RSTAS,OUT
      REWIND 0
      REWIND 1
      CALL CHKPT(30)
C
C     PARAMETER CARD-IF ANTN BLANK 30-DAY ANTECEDENT CONDITIDNS OMITTED
C
  146 READ(5,1000)ANTA,ANTN,RBA,RBN,REA,REN,QANTA,QANTN,DBA,QBN,QEA,QEN,
     1CORT,RSTAS,NEND,NTEMP,NOP1,NOP2,IWIDIN,INGAGE,KRWD0,KRWD1
 1000 FDRMAT(6(1X,A3,A5),I1,I2,4I1,I4,I2,2I1)
      IF(KRWD0.EQ.0)GO TD 9214
      END FILE 0
      REWIND 0
 9214 IF(KRWD1.EQ.0)GO TO 9211
      END FILE 1
      REWIND 1
C
C     DETERMINE IF 30-DAY ANTECEDENT CONDITIONS NEEDED
C
 9211 KOCHK=9
      KORAI=8
      KEND=99
      NFOR=1
      NBR=1
      KIW=0
      IF(RSTAS.EQ.0)GO TO 11
      NFOR=2
      NBR=2
   11 NGO=0
      LAST=1
      KRUN=1
      DO 911 I=1,12
      PYRSP(I)=0.
  911 YRSREC(I)=0.
      GO TO(965,961),NOP1
C
C     LDAD WATERSHED CONVERSION FACTDRS-3 CARDS
C
  961 DO 4 I=1,15,5
      JJ=I+4
    4 READ(5,1007)(RA(J),J=I,JJ),(AREA(J),J=I,JJ)
 1007 FORMAT(5F10.10,5F6.2)
  965 GD TD(960,1),NOP2
C
C     LDAD STATION AVERAGE MONTHLY RAINFALL AND NUMBER YEARS RECORD PER
C     MONTH FROM PREVIOUS YEARS CDMPUTATIONS-TWO CARDS
C
    1 DO 9 I=1,12,6
      KK=I+5
    9 REAO(5,1020)(PYRSP(K),YRSREC(K),K=I,KK)
 1020 FORMAT(6(F6.2,F4.0))
C
C     LOAO THIESSEN WEIGHTS
C
      READ(5,1005)(TWTS(I),I=1,6)
 1005 FORMAT(6F3.2)
C
C     ZERO STORAGE AREA
C
  960 DO 10 I=1,12
      DO 10 J=1,33
      P(I,J)=0.
      CTABLE(I,J)=0.
   10 KD(I,J)=NTYPE(1)
      K=0
      NRSTAS=0
      COUNT=0
      NUMBER=0
      NYR=0
      LBR=1
C
      REWIND 2
C
C     PAST YEARS AVERAGES AND YEARS OF RECORD
C     OETERMINE THIESSEN WEIGHT DF R-1 GAGE
C     CORT=1,DATA ON CAROS(TAPE 5)
C     CORT=2,DATA ON TAPE 0
C
      GO TO(30,950),NBR
  950 GO TO(130,140),CORT
C
C     R-1 DAILY RAINFALL ON CARDS
C
  130 REAO(5,I040)MONTH,NDAY,NYEAR,DAC,LTYPRE,JEND
 1040 FORMAT(I2,2I3,2X,F4.2,AI,64X,I1)
      IF(JENO.EO.8)READ(5,1005)(TWTS(I),I=I,6)
  131 P(MONTH,NDAY)=TWTS(1)*DAC
      DO 135 I=1,8
      IF(LTYPRE.EQ.NTYPE(I))GD TD 136
  135 CONTINUE
      I=I-1
  136 KD(MONTH,NDAY)=NTYPE(I)
      IF(NFOR.EQ.5)GO TO 1777
      IF(JEND.NE.9)GO TO 130
      IF(QANTN.NE.NBLK(4))READ(5,1005)(TWTS(I),I=1,6)
      GO TO 30
C
C     R-1 DAILY RAINFALL ON TAPE 0
C
  140 NFOR=5
      NGO=0
      LTYPRE=NTYPE(1)
      NETYPE=NTYPE(1)
      GO TD 20
  145 IF(IWID.EQ.IWIDIN)KIW=1
      IF(KIW.EQ.0)GO TO 20
      IF(ANTN.EQ.NBLK(4))GO TO 3144
      IF(ANTA.EQ.KUPDAT.AND.ANTN.EQ.NUM)READ(5,1005)(TWTS(I),I=1,6)
 3144 IF(NGO.NE.0)GO TO 14B
      NGO=I
      NETYPE=LTYPRE
 3145 NDAY=NDAYD
      DAC=DACO
      MONTH=MONTHO
      NETYO=NETYPE
      GO TO 20
  14B IF(NDAY.EQ.NDAYO)GO TO 147
      NP=LTYPRE
      LTYPRE=NETYO
      NETYPE=NTYPE(1)
      GO TO 131
 1777 LTYPRE=NP
  147 IF(LTYPRE.NE.NTYPE(1))NETYPE=LTYPRE
      IF(IWID.EQ.99.OR.IWID.EQ.999)GO TO 7729
      GD TO 3145
C
C     END R-1 DAILY RAINFALL COMPUTATIONS
C
C     RUNOFF DATA ON TAPE 1
C
 7729 IF(ANTN.EQ.NBLK(4))GD TD 7730
      READ(5,1005)(TWTS(I),I=1,6)
 7730 NFOR=2
   30 READ(1,1021)IW,ID,MONQ,NDAYQ,NYEAR,HRQ,AJRATE,RUNTI,ACDR,ACYRR,KOD
     1Q,KUPDAT,NUM
 1021 FORMAT(I3,I2,3I3,F8.0,37X,F10.0,10X,2F10.0,10X,F10.0,I3,1X,A3,A5)
      IWID=IW*100+ID
      IF(NYR.NE.0)GO TO 405
      GO TO(9905,9906),NBR
 9905 DO 5 I=1,12
      DO 5 J=1,33
    5 ARUN(I,J)=0.
 9906 NYR=1
      A=NYEAR
      A=A/4.
      NY=A
      AA=NY
      M(2)=28
      IF(A.EQ.AA)M(2)=29
  405 GO TO(406,406,170,170),KRUN
  406 GO TO(31,33),NBR
C
C     DETERMINE BEGINNING OF ANTECEDENT RUNOFF
C
   31 IF(QANTA.EQ.KUPDAT.AND.QANTN.EQ.NUM)K=1
C
C     BRANCH TO STATEMENT 169 DETERMINES DAILY DISCHARGE IN CFS
C
      IF(K.EQ.0)GO TO(30,169),NBR
 3336 IF(KODQ.EQ.7)ARUN(MONQ,NDAYQ)=ACDR
      GO TO(33,40),LAST
C
C     DETERMINE BEGINNING OF SELECTEO RUNOFF EVENT
C
   33 IF(QBA.EQ.KUPDAT.AND.QBN.EQ.NUM)GO TD(34,41),NBR
      KRUN=I
      GO TO(30,170),NBR
   34 LAST=2
      GO TO 3336
   40 KRUN=2
      ARUN(MONO,NDAYO)=ACDR
      DO 2241 I=I,12
      DO 2241 J=1,33
 2241 ARAIN(I,J)=0.
C
C     RAINFALL DATA ON TAPE 0
C
   41 LAST=1
      K=0
      NGO=0
      IDW=ID
   20 REAO(0,1010)IWID,IGAGE,MONTHO,NOAYO,NYEAR,HR,AI,ACP,DACD,LTYPRE,KO
     1DE,KUPDAT,NUM
 1010 FORMAT(I4,2X,I1,3I3,FB.0,10X,2FB.0,BX,FB.D,I0X,AI,I3,2X,A3,A5)
      IF(RSTAS.EQ.0.DR.OANTN.EO.NBLK(4))GD TO 22
      IF(DANTA.EQ.KUPDAT.AND.OANTN.EQ.NUM)REAO(5,1005)(TWTS(I),I=I,6)
   22 IF(KODE.EO.2.AND.NFOR.EQ.4)GO TO 160
      IF(KODE.NE.0.AND.KODE.NE.2)GO TO 20
      GD TD(2I,26,I01,150,145),NFOR
C
C     DETERMINE BEGINNING OF 30-OAY ANTECEOENT RAINFALL
C
   21 IF(ANTA.EO.KUPDAT.AND.ANTN.EO.NUM)K=1
C
C     BRANCH TO STATEMENT 150 DETERMINES OAILY THIESSEN WTD RAINFALL
C
      IF(K.EO.0)GO TO(20,I50),NBR
      K=K+1
      IF(K.EO.2)GD TO 4275
      IF(NDAY.EQ.NOAYO)GO TO 4275
   25 ARAIN(MONTH,NDAY)=DAC
 4275 GO TD(26,2B),LAST
```

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C
C     DETERMINE BEGINNING OF SELECTEO RAINFALL EVENT
C
   26 IF(RBA.EO.KUROAT.AND.REN.EQ.NUM)GO TO(27,80),NBR
      GO TO 150
   80 N=-NDAYO
      NTY=NTYPE(1)
      IF(ACOR.NE.0.0.ANC.ACCR.LT.0.DOOD5)NTY=NTYPE(2)
      WRITE(2,205D)MONTHO,N,CACO,ACDR,NTY,KOCHK
 205D FORMAT(2I3,F5.2,F7.4,A1,59X,I2)
      DO 2049 I=1,3
 2049 WRITE(2,2055)(NBLK(J),J=1,4),KOCHK
 2055 FORMAT(3A6,A5,55X,I2)
      GO TO 4081
   27 LAST=2
      IF(DACO.EQ.0.0)GO TO 28
      DAC=OACO
      GO TO 25
C
C     WRITE 30-DAY ANTECEOENT DATA ON SCRATCH TAPE 2
C
   28 OO 7D I=1,12
      OO 6659 J=1,31
      NO=-J
      IF(ARUN(I,J).EO.0.0.ANC.ARAIN(I,J).EO.0.0)GO TO 6659
      NTY=NTYPE(1)
      IF(ARUN(I,J).NE.0.0.ANO.ARUN(I,J).LT.0.00005)GO TO 55
C
C     RAINFALL OR RUNOFF
C
      WRITE(2,1032)I,NO,ARAIN(I,J),ARUN(I,J),NTY
 1032 FORMAT(2I3,F5.2,F7.4,A1)
      GO TO 6658
C
C     TRACE RUNOFF
C
   55 NTY=NTYRE(2)
      WRITE(2,1033)I,ND,ARAIN(I,J),NTY
 1033 FORMAT(2I3,F5.2,7X,A1)
 6658 COUNT=COUNT+1
 6659 CONTINUE
   70 CONTINUE
C
C     REAO ANO STORE ANTECEDENT CONDITIONS
C
 4079 REWINO 2
      DO 4247 I=1,COUNT
 4247 REAO(2,2020)(MATC(I,J),J=1,4)
 2020 FORMAT(3A6,A1)
      REWIND 2
      GO TO(4081,175),LBR
C
C     BEGAN COMPUTATIONS FOR SELECTED RAINFALL EVENT
C
 4081 SUM=0.0
      ACP=0.00
      AI=0.0
      NFOR=3
      M4=D
  101 LHR=HR
      AT=LHR
      LMIN=(HR-AT)*60.+0.005
      LCOOT=LHR*100+LMIN+10D00
      SUM=SUM+ACR
      IF(M4.NE.0)GO TO 1D38
      M4=1
      GO TO 1D39
 1D38 IF(MONTH.EO.MONTHO.AND.NOAY.EQ.NOAYO)GO TO 1D2
 1039 NOI=-NDAYO
      WRITE(2,1036)MONTHO,NOI,LCOOT,AI,SUM,KORAI
 1036 FORMAT(2I3,I6,F6.2,F5.2,55X,I2)
      GO TO 103
  102 WRITE(2,1035)NBLK(1),LCOOT,AI,SUM,KORAI
 1035 FORMAT(A6,I6,F6.2,F5.2,55X,I2)
  103 NUMBER=NUMBER+1
C
C     DETERMINE END OF SELECTED RAINFALL EVENT
C
      IF(REA.EQ.KUPDAT.AND.REN.EQ.NUM)GO TO 149
      GO TO 150
C
C     COUNT NUMBER OF RAINGAGE STATION PROCESSEO
C
  149 GO TO(175,4149),NBP
 4149 NRSTAS=NRSTAS+1
      NFOR=4
C
C     ALL RAINFALL DATA PROCESSED THROUGH SELECTED EVENT DATA
C     CONTINUE TO PROCESS REMAINING DATA FOR THIESSEN WEIGHTED OAILY  AINFALL
C
  150 IF(NGO.NE.D)GO TO(152,155),NBR
      NGO=1
  152 MONTH=MONTHO
      NDAY=NDAYO
      OAC=DACO
      IGG=IGAGE
      GO TO 20
  155 IF(IWIDIN.EQ.IWID.AND.INGAGE.EO.IGAGE.AND.NDAY.NE.NOAYO)R(MONTH,ND
     1AY)=P(MONTH,NDAY)+TWTS(IGAGE)*OAC
      GO TO 152
C
C     DETERMINE IF ALL RAINGAGES HAVE BEEN ANALYZED
C
  16D P(MONTH,NDAY)=P(MONTH,NDAY)+TWTS(IGG)*OAC
      IF(NRSTAS.EQ.RSTAS)GO TO 4080
      DO 2561 I=1,2
 2561 WRITE(2,2060)(NBLK(J),J=1,4),KORAI
 2060 FORMAT(3A6,A5,55X,I2)
      NUMBER=NUMBER+2
      READ(5,216)IRBA,REN,REA,PEN,OANTA,OANTN,NEND,IWIDIN,INGAGE
  216 FORMAT(9X,3(1X,A3,A5),21X,I1,2X,I4,I2)
      IF(OANTN.NE.NBLK(4))READ(5,1005)(TWTS(I),I=1,6)
      NFOR=2
      GO TO 4)
```

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C
C     OAILY OISCHARGE(CFS)
C
  169 KRUN=1
  17D GO TO(179,171),NBR
  171 IF(IWIOIN.EQ.IWIO.AND.KODO.EO.7)CTABLE(MONO,NOAYO)=AREA(IO)*ACOR/2
     13.8D1653
      GO TO(30,41,179,401),KRUN
C
C     BEGAN SELECTEO RUNOFF EVENT ANO OUTPUT OF ALL OATA
C
 4080 COUNT=0
      WRITE(2,2562)KENO
 2562 FORMAT(77X,I3)
      REWIND 2
 2564 READ(2,2563)NA1,NA2,NA3,NA4,NA5
 2563 FORMAT(3A6,A1,58X,I3)
      IF(NA5.EO.99)GO TO 175
      IF(NA5.NE.9)GO TO 2564
      COUNT=COUNT+1
      MATC(COUNT,1)=NA1
      MATC(COUNT,2)=NA2
      MATC(COUNT,3)=NA3
      MATC(COUNT,4)=NA4
      GO TO 2564
  175 KRUN=3
      REWIND 2
      NRUOFF=1
      JI=1
      RUNTI=0.
      SUMO=0.
      MM=1
      OUT=1
      MMM=1
      MR=1
      GO TO(176,17D),NBR
  176 NOM=MONO
      NDO=NDAYO
      IF(MMM.EQ.1)GO TO 182
      GO TO 30
  179 IF(KOOQ.NE.0)GO TO 3D
      SUMO=SUMO+RUNTI
      LSW=1
      IF(NDO.EO.NDAYO.AND.NOM.EO.MONO)GO TO 182
      LSW=2
      GO TO 181
  182 IF(MMM.EO.1)LSW=2
  181 NTRACE=1
      NOO=-NOAYO
      IF(SUMO.NE.D.0.ANO.SUMO.LT.D.ODDD5)NTRACE=2
  177 GO TO(18D,178),NBR
  178 AJRATE=AJRATE/RA(1D)
  180 LHR=HRO
      AT=LHR
      LMIN=(HRO-AT)*60.+D.D05
      LTIMEO=LHR*1DD+LMIN+10DDD
C
C     SELECTED EVENT OUTRUT
C     NUMBER OF ANTECEOENT VALUES STOREO AS COUNT
C     ONLY ONE VALUE STOREO PER STATION FOR NEW FORMAT
C     NUMBER OF RAINFALL VALUES STOREO AS NUMBER
C     OETERMINE DATA TO BE WRITTEN AND ITS FORMAT
C
  19D IF(MR.GT.COUNT)GO TO 192
      IF(MR.GT.NUMBER)GO TO 210
      GO TO 215
  192 IF(MR.GT.NUMBER)GO TO 201
  193 REAO(2,2D01)MODA,LTIMER,NAI,NSUM,KORAI
 20D1 FORMAT(3A6,A5,55X,I2)
      IF(KORAI.NE.8)GO TO 193
C
C     RAINFALL ONLY
C
      GO TO(4232,4233),NRUOFF
 4233 WRITE(7,2D12)MODA,LTIMEP,NAI,NSUM,MM
 2012 FORMAT(19X,3A6,A5,3DX,I8)
      GO TO 22D
C
C     RAINFALL AND RUNDFF ONLY
C
 4232 GO TO(954D,9541),LSW
 9540 GO TO(3DD,9542),NTRACE
  3DD WRITE(7,2DD2)MODA,LTIMER,NAI,NSUM,LTIMEQ,AJRATE,SUMO,MM
 2DD2 FORMAT(19X,3A6,A5,6X,I6,F10.4,F7.4,1X,I8)
      GO TO 220
 9542 WRITE(7,9543)MODA,LTIMEP,NAI,NSUM,LTIMEQ,AJRATE,MM
 9543 FORMAT(19X,3A6,A5,6X,I6,F1D.4,7X,1HT,I8)
      GO TO 22D
 9541 GO TO(301,9544),NTRACE
  301 WRITE(7,2006)MOOA,LTIMEP,NAI,NSUM,MONO,NOO,LTIMEO,AJRATE,SUMO,MM
 2DD6 FORMAT(19X,3A6,A5,2I3,I6,F10.4,F7.4,1X,I8)
      GO TO 22D
 9544 WRITE(7,9545)MOOA,LTIMEP,NAI,NSUM,MONO,NGO,LTIMEO,AJRATE,MM
 9545 FORMAT(19X,3A6,A5,2I3,I6,F1D.4,7X,1HT,I8)
      GO TO 22D
C
C     RUNOFF ONLY
C
  201 GO TO(9546,9550),LSW
 9546 GO TO(20D,9547),NTRACE
  20D WRITE(7,2D00)LTIMEQ,AJRATE,SUMO,MM
 20DD FORMAT(48X,I6,F10.4,F7.4,1X,I8)
      GO TO 22D
 9547 WRITE(7,9548)LTIMEO,AJRATE,MM
 9548 FORMAT(48X,I6,F10.4,7X,1HT,I8)
      GO TO 22D
 955D GO TO(202,9551),NTRACE
  2D2 WRITE(7,2D07)MONQ,NQD,LTIMEQ,AJRATE,SUMQ,MM
 20D7 FORMAT(42X,2I3,I6,F10.4,F7.4,1X,I8)
      GO TO 22D
 9551 WRITE(7,9552)MONO,NOD,LTIMEQ,AJRATE,MM
 9552 FORMAT(42X,2I3,I6,F10.4,7X,1HT,I8)
      GO TO 220
```

```
C
C     ANTECEDENT CONDITIONS ONLY
C
  210 GO TOI4240.4241).NRUOFF
 4241 WRITEI7.2013)(MATC(JI.JJI).JJI=1.4).MM
 2013 FORMAT(3A6.A1.53X.I8)
      GO TO 220
C
C     ANTECEDENT CONDITIONS AND RUNOFF
C
 4240 GO TOI9561.9571).LSW
 9561 GO TO(3211.9562).NTRACE
 3211 WRITE(7.2003)(MATC(JI.JJI).JJI=1.4).LTIMEQ.AJRATE.SUMO.MM
 2003 FORMATI3A6.A1.29X.I6.FI0.4.F7.4.IX.I8)
      GO TO 220
 9562 WRITE(7.9563)(MATCIJI.JJI).JJI=1.4).LTIMEO.AJRATE.MM
 9563 FORMATI3A6.A1.29X.I6.F10.4.7X.IHT.I8)
      GO TO 220
 9571 GO TO(3212.9572).NTRACE
 3212 WRITE(7.2008)(MATC(JI.JJi).JJI=I.4).MONO.NQD.LTIMEQ.AJRATE.SUMQ.MM
 2008 FORMAT(3A6.A1.23X.2I3.I6.F10.4.F7.4.1X.I8)
      GO TO 220
 9572 WRITE(7.9574)(MATC(JI.JJI).JJI=1.4).MONO.NQD.LTIMEO.AJRATE.MM
 9574 FORMAT(3A6.A1.23X.2I3.I6.F10.4.7X.IHT.I8)
      GO TO 220
  215 READ(2.2001)MODT.LTIMEP.NAI.NSUM.KORAI
      IF(KORAI.NE.8)GO TO 215
C
C     ANTECEDENT CONDITIONS AND RAINFALL
C
      GO TOI4250.4251).NRUOFF
 4251 WRITE(7.2014)(MATCIJI.JJ1).JJI=1.4).MODT.LTIMEP.NAI.NSUM.MM
 2014 FORMAT(3A6.A1.3A6.A5.30X.I8)
      GO TO 220
C
C     ANTECEDENT CONDITIONS-RAINFALL-RUNOFF
C
 4250 GO TOI9583.9589).LSW
 9583 GO TO(216.9584).NTRACE
  216 WRITE(7.2009)(MATC(JI.JJI).JJI=1.4).MODT.LTIMEP.NAI.NSUM.LTIMEQ,AJ
     1RATE.SUMO.MM
 2009 FORMAT(3A6.A1.3A6.A5.6X.I6.F10.4.F7.4.1X.I8)
      GO TO 220
 9584 WRITE(7.9585)(MATC(JI.JJI).JJI=1.4).MODT.LTIMEP.NAI.NSUM.LTIMEO.AJ
     1RATE.MM
 9585 FORMAT(3A6.A1.3A6.A5.6X.I6.F10.4.7X.1HT.I8)
      GO TO 220
 9589 GO TO(217.9592).NTRACE
  217 WRITE(7.2004)(MATC(J1.JJI).JJI=1.4).MODT.LTIMEP.NAI.NSUM.MONO.NOD.
     1LT1MEQ.AJRATE.SUMO.MM
 2004 FORMAT(3A6.A1.3A6.A5.2I3.I6.F10.4.F7.4.1X.I8)
      GO TO 220
 9592 WRITE(7.9593)(MATCIJI.JJI).JJI=1.4).MODT.LTIMEP.NAI.NSUM.MONO.NOD.
     1LTIMEO.AJRATE.MM
 9593 FORMAT(3A6.A1.3A6.A5.2I3.I6.F10.4.7X.1HT.I8)
  220 MM=MM+1
      MR=MR+1
      JI=JI+1
      IFIOUT.NE.5)GO TO 3221
      OUT=1
      WRITEI7.2005)MM
      MM=MM+1
 2005 FORMAT(72X.I8)
      GO TO 225
 3221 OUT=OUT+1
C
C     DETERMINE END OF SELECTED RUNOFF EVENT
C
  225 IFIOEA.EO.KUPDAT.AND.OEN.EO.NUM)GO TO 400
      MMM=2
      GO TO 176
  400 IF(MR.GT.COUNT.AND.MR.GT.NUMBER)GO TO 4227
      NRUOFF=2
      GO TO 190
 4227 GO TO(4225.4226).NBR
 4226 KRUN=4
      GO TO 30
C
C     DETERMINE IF END OF RUNOFF STATION
C
  401 IFIIWID.EO.99.OR.IWID.EO.999)GO TO 500
      GO TO 30
C
C     MEAN DAILY DISCHARGE AND THIESSEN WEIGHTED RAINFALL OUTPUT
C
C
C     DETERMINE AVERAGES AND SUMS OF MEAN DAILY DISCHARGES AND THIESSEN
C     WEIGHTED RAINFALL
C
  500 DO 5020 J=1.12
      SUMP=0.
      SUM=0.
      II=MIJ)
      AI1=II
      DO 5019 I=1.II
      IF(P(J.I).EO.0.0)GO TO 5017
      LPR=(P(J.I)+.005)*100.
      ALPR=LPR
      SUMP=SUMP+ALPR*.01
 5017 IF(CTABLEIJ.I).NE.0.0)SUM=SUM+CTABLE(J.I)
 5019 CONTINUE
      CTABLE(J.32)=SUM/AII
      P(J.32)=SUMP
      P(J.33)=ISUMP+PYRSP(J)*YRSREC(J))/IYRSRECIJ)+1.)
      YRSREC(J)=YRSRECIJ)+1.
 5020 CTABLEIJ.33)=SUM*23.8OI653/AREA(IDW)
C
C     DETERMINE IF HAVE TRACE RUNOFF OR RAINFALL
C
      DO 5050 J=1.12
      DO 5050 I=1.33
      IF(CTABLE(J.II.NE.0.0.AND.CTABLEIJ.I).LT.0.005)CTABLEIJ.I)=99999.9
     19
      IF(P(J.I).NE.0.0.AND.P(J.I).LT.0.005)P(J.I)=99999.99
 5050 CONTINUE
C
      REWIND 2
C
C     NSEND=1 FOR RUNOFF OUTPUT
C     NSEND=2 FOR RAINFALL OUTPUT
C     RUNOFF AND RAINFALL FIRST WRITTEN ON SCRATCH TAPE 2
C     TABLES CTABLEIJ.1) AND P(J.I) ARE WRITTEN 3 MONTHS PER BLOCK
C
      NSEND=1
C
C     DETERMINE TYPE OF OUTPUT FORMAT
C
 5051 LL=1
      LLL=3
      DO 5300 1L=1.4
      DO 5290 I=1.33
      K=0
      DO 5100 LJ=LL.LLL
      K=K+1
      GO TOI5079.5081).NSEND
 5079 IFICTABLE(LJ.I).EO.99999.99IGO TO 5080
      GO TO 5078
 5081 IF(P(LJ.I).EO.99999.99)GO TO 5080
 5078 NCODEIK)=2
      GO TO 5100
 5080 NCODEIK)=1
 5100 CONTINUE
      NFORM=NCODE(1)*I00+NCODEI2)*IC+NCODEI3)
      DO 5120 MM=1.8
      IF(NUMB(MM).EO.NFORM)GO TO(5600.5601.5602.5603.5604.5605.5606.5607
     1).MM
 5120 CONTINUE
C
C     ALL THREE DAYS TRACE
C
 5600 WRITE(2.111)
  111 FORMATI3(8X.1HT))
      GO TO 5290
C
C     NO TRACE RUNOFF OR RAINFALL
C
 5601 GO TO(7002.7003).NSEND
 7002 WRITE(2.222)ICTABLE(MI.I).MI=LL.LLL)
  222 FORMAT(3(F8.2.1X)I
      GO TO 5290
 7003 WRITE(2.888)(P(MI.I).KDIMI.II.MI=LL.LLL)
  888 FORMAT(3IF8.2.A1))
      GO TO 5290
C
C     FIRST DAY TRACE
C
 5602 LO=LL+1
      GO TO(7004.7005).NSEND
 7004 WRITE(2.122)(CTABLE(MI.I).MI=LO.LLL)
  122 FORMATI8X.1HT.2(F8.2.1X))
      GO TO 5290
 7005 WRITEI2.788)(P(MI.I).KD(MI.I).MI=LO.LLL)
  788 FORMATI8X.1HT.2(F8.2.A1))
      GO TO 5290
C
C     FIRST TWO DAYS TRACE
C
 5603 GO TOI7006.7007).NSEND
 7006 WRITEI2.112)CTABLEILL+2.I)
  112 FORMAT(2(8X.1HT).F8.2)
      GO TO 5290
 7007 WRITE(2.778)P(LL+2.I).KD(LL+2.I)
  778 FORMAT(2I8X.1HT).F8.2.A1)
      GO TO 5290
C
C     SECOND DAY TRACE
C
 5604 GO TO(7008.7009).NSEND
 7008 WRITE(2.212)CTABLEILL.I).CTABLE(LL+2.I)
  212 FORMAT(F8.2.9X.1HT.F8.2)
      GO TO 5290
 7009 WRITE(2.878)P(LL.I).KD(LL.I).P(LL+2.I).KDILL+2.I)
  878 FORMATIF8.2.AI.8X.1HT.F8.2.A1)
      GO TO 5290
C
C     LAST DAY TRACE
C
 5605 LO=LLL-1
      GO TOI7010.7011).NSEND
 7010 WRITE(2.221)(CTABLE(MI.I).MI=LL.LO)
  221 FORMAT(2(F8.2.1X).8X.1HT)
      GO TO 5290
 7011 WRITEI2.887)IP(MI.1).KDIMI.I).MI=LL.LO)
  887 FORMATI2(F8.2.A1).8X.IHT)
      GO TO 5290
C
C     FIRST AND THIRD DAY TRACE
C
 5606 GO TO(7012.7013).NSEND
 7012 WRITE(2.121)CTABLE(LL+1.I)
  121 FORMATI8X.1HT.F8.2.9X.IHT)
      GO TO 5290
 7013 WRITE(2.787)P(LL+1.I).KD(LL+1.1)
  787 FORMAT(8X.1HT.F8.2.A1.8X.1HT)
      GO TO 5290
C
C     SECOND AND THIRD DAY TRACE
C
 5607 GO TOI7014.7015).NSEND
 7014 WRITEI2.211ICTABLEILL.II
  211 FORMAT(F8.2.1X.2I8X.1HT))
      GO TO 5290
 7015 WRITEI2.877)P(LL.I).KD(LL.I)
  877 FORMAT(F8.2.A1.2(8X.1HT))
 5290 CONTINUE
      LL=LL+3
 5300 LLL=LLL+3
      NSEND=NSEND+1
      IF(NSEND.EQ.2)GO TO 5051
C
```

APPENDIX LIST E1. -- CONTINUED

```
      REWIND 2
      NSENO=1
C
C
C     OUTPUT RUNOFF ANO RAINFALL-PUNCH CARDS AND LIST
C
 5303 DO 5400 I=1,132
 5400 REAO(2,6001)(NT(I,J),J=1,6)
 6001 FORMAT(3(A6,A3))
      NUM=1
      NUM1=2
      DO 5450 I=1,33
      IF(I.GT.M(2))GO TO 5430
 5425 WRITE(7,6002)(NT(I,II),II=1,6),(NT(I+33,II),II=1,6),(NT(I+66,II),I
     1I=1,4),NUM,(NT(I+66,II),II=5,6),(NT(I+99,II),II=1,6),NUM1
 6002 FORMAT(8(A6,A3),I5,2X,1H1/4(A6,A3),36X,I5,2X,1H2)
      IF(I.GT.31)GO TO 5440
      GO TO 5438
 5430 IF(I.GT.30)GO TO 5435
      WRITE(7,6004)(NT(I,II),II=1,2),(NT(I,II),II=5,6),(NT(I+33,II),II=1
     1,6),(NT(I+66,II),II=1,4),NUM,(NT(I+66,II),II=5,6),(NT(I+99,II),II=
     21,6),NUM1
 6004 FORMAT(A6,A3,9X,6(A6,A3),I5,2X,1H1/4(A6,A3),36X,I5,2X,1H2)
      GO TO 5440
 5435 IF(I.GT.31)GO TO 5425
      WRITE(7,6005)(NT(I,II),II=1,2),(NT(I,II),II=5,6),(NT(I+33,II),II=3
     1,4),(NT(I+66,II),II=1,4),NUM,(NT(I+99,II),II=1,2),(NT(I+99,II),II=
     25,6),NUM1
 6005 FORMATI3(A6,A3,9X),2(A6,A3),I5,2X,IH1/2(9X,A6,A3),36X,I5,2X,1H2)
      GO TO 5440
 5438 KOUNT=KOUNT+2
      IF(KOUNT.NE.10)GO TO 5440
      KOUNT=0
      NUM=NUM1+1
      WRITE(7,6003)NUM
 6003 FORMAT(72X,I5)
      NUM=NUM1
      NUM1=NUM+1
 5440 NUM=NUM+2
 5450 NUM1=NUM+1
      NSEND=NSEND+1
      KOUNT=0
      CALL CHKPT(30)
      IF(NSENO.EO.2)GO TO 5303
      WRITE(7,6666)(P(1,33),YRSREC(I),I=1,6),KEND,(P(I,33),YRSREC(I),I=7
     1,12),KEND
 6666 FORMAT(6(F6.2,F4.0),17X,I3/6(F6.2,F4.0),17X,I3)
      IF(NTEMP.EQ.0)GO TO 4225
C
C     MAXIMUM-MINIMUM TEMPERATURE COMPUTATIONS
C     STORE MAXIMUMS IN MATRIX CTABLE AND MINIMUMS IN MATRIX P
C
      00 8002 I=1,12
      AVMX(I)=0.0
 8002 AVMN(I)=0.0
      DO 8003 I=1,12
      DO 8003 J=1,33
      NTMAX(I,J)=0
 8003 NTMIN(I,J)=0
      READ(5,8005)(AVMX(K),AVMN:K),K=1,12),AK
 8005 FORMAT(12F6.1/12F6.1,F8.0)
      C=AK+1.
      DO 8050 I=1,12
      II=M(I)
      NSUM1=0
      NSUM2=0
      L=0
      DO 8040 J=1,II
      READ(5,8010)MONTH,NOAY,NTMAX(MONTH,NDAY),NTMIN(MONTH,NDAY),LENO
 8010 FORMAT(2I2,2I4,67X,I1)
      NSUM1=NSUM1+NTMAX(MONTH,NDAY)
      NSUM2=NSUM2+NTMIN(MONTH,NDAY)
      IF(L.NE.0)GO TO 8021
      NC1=NTMAX(MONTH,NDAY)
      NC2=NTMIN(MONTH,NOAY)
      L=1
      GO TO 8040
 8021 IF(NTMAX(MONTH,NOAY).GT.NC1)NC1=NTMAX(MONTH,NDAY)
      IF(NTMIN(MONTH,NDAY).LT.NC2)NC2=NTMIN(MONTH,NOAY)
      IF(LENO.EQ.9)GO TO 8041
 8040 CONTINUE
 8041 NTMAX(I,32)=NSUM1/II
      NTMIN(I,32)=NSUM2/II
      A=NTMAX(I,32)
      B=NTMIN(I,32)
      AC1=NC1
      AC2=NC2
      AMEAN(I)=(AC1+AC2)/2.
      NTMAX(I,33)=(AVMX(I)*AK+A)/C
      NTMIN(I,33)=(AVMN(I)*AK+B)/C
      AVMX(I)=(AVMX(I)*AK+A)/C
      AVMN(I)=(AVMN(I)*AK+B)/C
 8050 CONTINUE
C
C     OUTPUT MAXIMUM-MINIMUM TEMPERATURE
C
      NUM1=1
      NUM2=2
      DO 8450 J=1,33
      IF(J.GE.32.OR.J.LE.M(2))GO TO 8425
      GO TO 8430
 8425 WRITE(7,8600)(NTMAX(I,J),NTMIN(I,J),I=1,8),NUM1,(NTMAX(I,J),NTMIN(
     1I,J),I=9,12),NUM2
 8600 FORMAT(8(2I4,1X),I5,2X,1H1/4(2I4,1X),36X,I5,2X,1H2)
      IF(J.EO.32)GO TO 8800
      IF(J.EO.33)GO TO 8450
      GO TO 8438
 8430 IF(J.GT.30)GO TO 8435
      WRITE(7,8604)NTMAX(1,J),NTMIN(1,J),(NTMAX(I,J),NTMIN(I,J),I=3,8),N
     1UM1,(NTMAX(I,J),NTMIN(I,J),I=9,12),NUM2
 8604 FORMAT(2I4,10X,6(2I4,1X),I5,2X,1H1/4(2I4,1X)36X,I5,2X,1H2)
      GO TO 8440
 8435 WRITE(7,8605)(NTMAX(I,J),NTMIN(I,J),I=1,6,2),(NTMAX(I,J),NTMIN(1,J
     1),I=7,8),NUM1,(NTMAX(I,J),NTMIN(I,J),I=10,12,2),NUM2
 8605 FORMAT(3(2I4,10X),2(2I4,1X),I5,2X,1H1/2(9X,2I4,1X),36X,I5,2X,1H2)
      GO TO 8440
 8600 NUMI=NUM1+2
      NUM2=NUM1+1
      WRITE(7,8805)(AMEAN(I),I=1,8),NUM1,(AMEAN(I),I=9,12),NUM2
 8805 FORMAT(F6.1,7(4X,F5.1),I8,2X,1H1/F6.1,3(4X,F5.1),39X,I5,2X,1H2)
      GO TO 8440
 8438 KOUNT=KOUNT+2
      IF(KOUNT.NE.10)GO TO 8440
      NUM1=NUM2+1
      WRITE(7,6003)NUM1
      KOUNT=0
      NUM1=NUM2
      NUM2=NUM1+1
 8440 NUM1=NUM1+2
 8450 NUM2=NUM1+1
      WRITE(7,8999)(AVMX(I),AVMN(I),I=1,12),C
 8999 FORMAT(12F6.1/12F6.1,F8.0)
 4225 IF(NEND.EQ.9)STOP
      KOUNT=0
      GO TO 146
      ENO
```

APPENDIX LIST E2. -- DETAILED DESCRIPTION OF THE VARIABLES USED IN PROGRAM E

DESCRIPTION OF VARIABLES

Input

Symbol	Description
ACDR	Accumulated daily runoff in inches.
ACP	Precipitation for given time interval in inches.
ACYRR	Accumulated yearly runoff in inches.
AI	Rainfall intensity for given time interval in in./hr.
AJRATE	Discharge rate corrected for pondage in in./hr.
AK	Length of station record for max-min temperature observations.
ANTA	Two definitions: 1. Update identification code for raingage station. (This code is given at the end of the rainfall listing.) 2. Update identification code for raingage R-1 specifying when new Thiessen weights apply. New Thiessen weights would be required if the raingage had been moved during the year. Note that this code applies only when R-1 data are on magnetic tape.
ANTN	Two definitions: 1. Sequence or list number for the beginning of antecedent conditions. (Antecedent conditions may be reported for any period; however, the most common reporting interval is 30 days.) 2. Sequence or list number that specifies when new Thiessen weights are to be applied to R-1 data.
AREA(J) J=1,15	Watershed area in acres.
AVMN(K) K=1,12	Station average minimum temperature.
AVMX(K) K=1,12	Station average maximum temperature.
CORT	Index code having possible values of 1 or 2. CORT = 1: R-1 daily rainfall data are on punch cards and must be read from normal input tape (S.SU05). CORT = 2: R-1 daily rainfall on the same tape as R-2, R-3, etc. (S.SU00).
DAC	Daily rainfall accumulation for R-1 gage when this data on punch cards (CORT = 1).
DACO	Daily rainfall accumulation in inches.
HR	Time of day in hours for precipitation event.
HRQ	Time of day in hours for runoff event.
I	Variable integer for indexing TWTS(I), NT(I,J) and the lower limit of the load loop for RA(J), AREA(J), PYRSP(K) and YRSREC(K).
ID	Last two digits of watershed identification number.
IGAGE	Raingage identification number.
INGAGE	Raingage from which the selected event is to be taken.
IWID	Watershed identification code.
IW	First two digits of the watershed identification code.
IWIDIN	Watershed identification code for the watershed from which the selected event is to be taken.
J	Variable integer for indexing RA(J), AREA(J) and NT(I,J).
JEND	Index code having possible values of 0 or 9. JEND = 0: More cards to be loaded. JEND = 9: Last data card for R-1 raingage.
JJ	Variable integer used to set the upper limit of the read loop for RA(J) and AREA(J).
K	Variable integer for indexing PYRSP(K) and YRSREC(K).
KK	Variable integer used to set the upper limit of the read loop for PYRSP(K) and YRSREC(K).
KODE	Index code identifying the information contained in a given line of precipitation input data. One print line is equivalent to 90 card column positions.
KODQ	Index code identifying the information contained in a given line of runoff input data. One print line is equivalent to 131 card column positions.
KORAI	Index code used to identify data written on scratch tape (S.SU02).
KRWDO	Index code having possible values of 0 or 1. KRWDO = 0: Continues normal input routines. KRWDO = 1: Precipitation tape must be rewound.
KRWD1	Index code having possible values of 0 or 1. KRWD1 = 0: Continues normal input routines. KRWD1 = 1: Runoff tape must be rewound.
KUPDAT	Update identification code for either precipitation or runoff
LEND	Index code having possible values of 0 or 9. LEND = 0: More max-min temperature data to be read. LEND = 9: Last max-min temperature data card.
LITMEP	The second 6-digit field from a given record on S.SU02. These data are a part of the precipitation selected event.
LTYPRE	Identification code specifying the type of precipitation (see Table A3).
MODA	The first 6-digit field from a given record on S.SU02. These data are a part of the precipitation selected event.
MODT	MODA
MONQ	Month of year (runoff data on S.SU01).
MONTH	Month of year (precipitation data on S.SU05) and as an index for NTMIN(MONTH, NDAY) and NTMAS(MONTH, NDAY).
MONTHO	Month of year (precipitation data on S.SU00).
NA1, NA2, NA3, NA4, NA5	Antecedent conditions that have been written on S.SU02 are defined as NA1, NA2, NA3, NA4, NA5, and are stored in matrix MATC.
NAI	The third 6-digit field from a given record on S.SU02. These data are a part of the precipitation selected event.
NDAY	Day of month (data for S.SU05) and as an index for NTMIN(MONTH, NDAY) and NTMAX(MONTH, NDAY).
NDAYO	Day of month (data from S.SU00).
NDAYQ	Day of month (data from S.SU01).
NEND	Index code having possible values of 0 or 9. NEND = 0: More parameter cards to follow. NEND = 9: Last parameter card to be processed.
NOP1	Index code having possible values of 1 or 2. NOP1 = 1: Cards containing watershed areas and rate conversion factors are not required. NOP1 = 2: The above tables are required.
NOP2	Index code having possible values of 1 or 2. NOP2 = 1: The station average monthly rainfall and years record per month plus Thiessen weight tables are not required. NOP2 = 2: The above tables are required.
NSUM	The fourth field (5-digit) from a given record on S.SU02. These data are a part of the precipitation selected event.
NT(I,J) I=1,132 J=1,6	A storage matrix for mean daily discharge and daily Thiessen weighted rainfall.
NTEMP	Index code having possible values of 0 or 1. NTEMP = 0. Max-min temperature summaries are not required. NTEMP = 1: Max-min temperature summaries are required.
NTMAX(MONTH, NDAY) MONTH=1,12 NDAY=1,31	Maximum daily temperature.
NTMIN(MONTH, NDAY) MONTH=1,12 NDAY=1,31	Minimum daily temperature.
NUM	Sequential list number. This number in conjunction with KUPDAT serves as the reference for locating specific areas on the input tapes.
NYEAR	Year.
PYRSP(K) K=1,12	Station average monthly precipitation in inches.
QANTA	Two definitions: 1. Update identification for the runoff station. (This code is given at the end of the runoff listing.) 2. Update identification code for the raingage station requiring a new Thiessen weight. In situations where Thiessen weight changes must be made, the first parameter card will contain coding (QANTA and QANTN) that will be required to locate the point at which the new Thiessen weight must be applied to the R-2 raingage. Subsequent parameter cards must contain similar information for R-3, R-4, etc., raingages
QANTN	Two definitions: 1. Sequence number for the beginning of antecedent runoff. 2. Sequence number that specifies the point at which new Thiessen weights are to be applied to R-2, R-3, R-4, etc., raingages.
QBA	Update identification code for selected runoff event.
QBN	Sequence number for the beginning of the selected runoff event.
QEA	Update identification for the end of the selected runoff event.
QEN	Sequence number for the end of the selected runoff event.
RA(J) J=1,15	Conversion factors (CFS - in./hr.).
RBA	Update identification code for the beginning of the selected rainfall event.
RBN	Sequence number for the beginning of the selected rainfall event
REA	Update identification code for the end of the selected rainfall event.
REN	Sequence number for the end of the selected rainfall event.
RSTAS	The number of raingages that will be used to report time-intensity values for selected event. The number normally is equal to the number of 24-hour raingages on the watershed.
RUNT1	Runoff for given time interval in inches.
TWTS(1) 1=1,6	Thiessen weights for given watershed.

APPENDIX LIST E2. -- CONTINUED

Symbol	Description
YRSREC(K) K=1,12	Years record associated with PYRSP(K)

Output

Symbol	Description
ACOR	See Input.
AI	See Input.
AJRATE	See Input.
AMEAN(I) I=1,12	The average of the maximum and minimum temperatures for the month Defined as: (AC1 + AC2)/2.
ARAIN(I,J) I=1,12 J=1,33	Storage matrix for antecedent precipitation in inches.
ARUN(I,J) I=1 12 J=1,33	Storage matrix for antecedent runoff in inches.
AVMN(I) I=1,12	Station average minimum temperature corrected for current years temperature.
C	Current number of years temperature records for each month (C = AK + 1).
CTABLE(MI,I) MI=1,12 I=1,33	Mean daily discharge in CFS.
DACO	See Input.
I	Variable integer for indexing AVMN(I), AVMX(I), CTABLE(MI,I), AMEAN(I), P(MI,I), KD(MI,I), ARAIN(I,J), ARUN(I,J), NT(I,II), NTMAX(I,J) and NTMIN(I,J).
II	Variable integer for indexing NT(I,II).
J	Variable integer for indexing ARAIN(I,J), ARUN(I,J), NTMAX(I,J), NTMIN(I,J), NBLK(J).
JI,JJI	Variable integers for indexing MATC(JI,JJI).
KD(MI,I) MI=1,12 I=1,33	Storage matrix for either a blank space or a T, depending on whether or not the Thiessen weighted rainfall or mean daily discharge value was 0.0005 inch or CFS, respectively. T for trace. Blank if value 0 or 0.005
KEND	Identification code designating the end of data written on S.SU02.
KOCHK	A constant (9) used to identify type of data written on S.SU02.
KORAI	Constant (8) used to identify data written on S.SU02.
LCOOT	Military time plus 10,000 for precipitation event.
LTIMEP	See Input
LTIMEQ	Military time plus 10,000 for runoff event.
MATC(JI,JJI) JI=1,32 JJI=1,4	Storage matrix for antecedent conditions. Data stored in alphameric mode.
MI	Variable integer for indexing P(MI,I) and KD(MI,I).
MM	Card sequence number.
MOOA	See Input.
MODT	See Input
MONQ	See Input.
MONTHO	See Input.
N	-NAYO (negative day).
NAI	See Input.
NBLK(J) J=1,4	Blank storage areas.
ND	-J (negative day).
NDI	-NOAYO (negative day).
NQO	-OAYQ (negative day).
NSUM	See Input
NT(I,II) I=1,132 II=1,6	See Input.
NTMAX(I,J) I=1,12 J=1,33	See Input.
NTMIN(I,J) I=1,12 J=1,33	See Input.

Symbol	Description
NTY	Type of precipitation code (Table A3).
NUM	Sequence number.
NUM1	Sequence number
NUM2	Sequence number.
P(MI,I) MI=1,12 I=1,33	Thiessen weighted daily precipitation.
SUM	Accumulated storm precipitation in inches.
SUMQ	Accumulated storm runoff in inches.
YRSREC(I) I=1,12	See Input

PROGRAM
(Input/Output Variables are not Included)

Symbol	Description
A	Year divided by 4 (leap year test) and average maximum temperature for the year.
AA	Truncated A (leap year test).
AC1	NC1 (converted to floating point arithmetic).
AC2	NC2 (converted to floating point arithmetic).
AII	Number of days per month.
ALPR	LPR (converted to floating point arithmetic).
AT	LHR (converted to floating point arithmetic).
B	Average minimum temperature for the year.
COUNT	Variable integer for indexing MATC(COUNT,I).
I	Variable index.
IDW	Last two digits of watershed identification code (IWIO).
IGG	IGAGE.
II	Number of days per month during max-min temperature computations. Also used as a variable index for indexing.
IL	Variable integer for indexing.
K	Variable integer used in branching instructions.
KIW	Variable integer used in branching instructions.
KOUNT	Counter to determine where blank cards are to be placed.
KRUN	Variable index for branching.
L	Index code to initialize max-min temperature search routine.
LAST	Variable integer for branching.
LBR	Variable integer for branching.
LHR	Variable integer for branching.
LHR	HR truncated.
LJ	Variable index.
LL,LLL	Variable indexes for write routine.
LMIN	Minutes--defined as: (LMIN = (HR-AT) 60 + .005.)
LO	Variable index for write loop.
LPR	Defined as: LPR = (P(J,I) + .005)100.
LSW	Variable integer for branching.
M4	Variable integer for branching
M(I) I=1,12	Days per month.
MM	Variable integer for indexing NUMB(MM).
MMM	Variable integer for branching.
MR	Counter of the number of cards punched
NBR	Variable integer for branching.
NCOOE(I) I=1,3	Variable integers having the value of 1, 2 or 3.
NC1	Maximum daily temperature for the month.
NC2	Minimum daily temperature for the month.
NDO	NDAYQ
NETYO	Previous value of NETYPE.
NETYPE	LTYPRE

Symbol	Description
NFOR	Format statement number defined as: NFOR = 100NCODE(1) + 10NCODE(2) + NCODE(3).
NGO	Variable integer for branching.
NP	Previous value of LTYPRE.
NQM	MONQ.
NRSTAS	Counter of the number of 24-hr. raingages processed.
NRUOFF	Variable integer for branching.
NSEND	Variable integer for branching.
NSUM1	Accumulated sum of daily maximum temperature.
NSUM2	Accumulated sum of daily minimum temperature.
NTRACE	Variable integer for branching.
NTYPE(I) I=1,8	Type of precipitation (see Table A3).
NUMB(MM) MM=1,8	Format statement numbers.
NUMBER	Count of the records written on S.SU02 for given precipitation selected event.
NY	A truncated (leap year test).
NYR	Variable integer for branching instructions.
OUT	Counter to determine where blank cards are to be inserted during selected event punch-out.

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